ASA BULLETIN

MAY, 1931 NUMBER 61

PUBLISHED MONTHLY FOR THE SUSTAINING MEMBERS OF THE AMERICAN STANDARDS ASSOCIATION, 29 WEST 39TH STREET, NEW YORK

Specifications and Tests for Paper Purchased by the U. S. Navy

by

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The physical and chemical properties of paper as a basis for the establishment of standard specifications and methods of test

Recently the restandardization of specifications for the various kinds of papers purchased by the Navy Department was undertaken. The problem was worked out from the twofold standpoint of establishing explicit technical requirements in each case, together with the setting up of standard samples for each type of paper to show color, finish, cleanliness, and formation. Practically every type of paper used by the Navy was subjected to various tests, both physical and chemical, with the object in mind of facilitating the procurement of a more uniform grade of paper.

The new system of purchase by means of specification-standard samples is now in effect and it is believed will prove advantageous in the matter of overcoming some of the difficulties formerly encountered. Moreover, with the more complete information now available as to the exact type of paper desired, it will be possible to obtain a wider and more reliable competition from government bidders than heretofore.

The discussion herein presented deals with some of the various grades of paper for which standards have been established and the different grades of stock suitable to meet the Navy requirements. The general factors upon which quality is based, as well as the technical aspects of evaluating the principal characteristics of paper, are also included.

A few general facts concerning the paper industry might be of interest in this connection. It is perhaps not generally known that the paper and pulp industry ranks seventh among the major industries in the United States. The production of paper on the North American continent alone exceeds 40,000 tons daily. At one time practically all the paper used was made from rag stock. Now only the more special and higher grades of writing paper are made from rag stock, especially where extra strength is required. The most important source of paper-making material today is wood pulp, which is prepared for use in paper-making in four ways. The products are known technically as "sulphite pulp," "soda pulp," "sulphate pulp," and "mechanical" or "ground-wood pulp." In addition to rag and wood pulp, a wide variety of other substances, such as straw, esparto, jute, etc., are used in the manufacture of paper where special properties are desired.

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Qualities of Paper

The quality of any paper is due primarily to the strength and cohesion of its constituent fibers. In evaluating papers, the foregoing, as well as the surface characteristics of paper, are important factors upon which tests are based. Paper consists essentially of an enormous number of fine fibers matted together and interwoven in such manner that a continuous surface is presented. The finish of paper, which is essentially a surface characteristic, is due primarily to the character of the inert materials used for loading it which are known as "fillers." Fillers, as the term is used in the paper industry, are finely divided substances added to the paper to fill up the spaces between the fibers composing the sheet. Such additions in moderate quantity can hardly be regarded as adulteration since they serve to fill up the pores of the paper, thus giving a sheet a closer texture that will take up ink more readily, enabling a high finish in the subsequent operations of calendering. The inclusion in specifications of an ash determination, which is an indication of the amount of inorganic fillers present, limits the quantity of fillers that can be used for certain papers. These inert materials add also to the opacity of papers, overcoming the inherent transparency of the basic cellulose composing the original fibers.

Finish of paper is dependent largely also upon the addition of sizing materials which are added mainly to render the naturally porous or absorbent surface more non-absorbent. Paper needs to be sized to prevent the spreading of ink, to

give it a good surface, and to impart the proper degree of stiffness and rattle. Various degrees of sizing are required for different papers, the degree of sizing and nature of the agent used depending upon the use to which the paper is to be put.

Use of Different Types of Paper

The general purposes for which papers are used commercially find similar applications in the Navy. Papers are principally used for writing, printing, and wrapping, as well as for such special purposes as drafting, filing, toweling, and blotting. Such items as carbon papers, envelopes, and paper bags are also purchased in large quantities, all of these various items being subjected to physical, chemical, and microscopical tests in order to determine their quality.

As regards the stock of such papers, in general 100 per cent rag paper is required for records and frequent handling, part rag paper for general use, and sulphite papers for temporary use where not subject to rough handling. The purpose for which the paper is needed is first determined and the quality specified accordingly. The Navy purchases 100 per cent rag stock, having a high mullen and folding endurance and corresponding to a high-grade bond paper for use on letterheads and for court-martial records. Fifty per cent rag in substance 9 is used for general manifold purposes, such quality being purchased in various grades and having a permanency of approximately 10 to 15 years. The 100 per cent coniferous bleached sulphite stock is specified for use where permanent records are not required. In addition to the foregoing, which are used most extensively, the following varieties are listed for regular purchases: paper, bond, printing, ledger, writing, mimeograph, tissue, kraft, tracing, waterproof, pressboard, manila, carbon papers.

Federal Specifications Used

The specifications under which these various papers are purchased are based upon those of the Federal Specifications Board. These specifications, which in turn are based upon the report of the Congressional Committee on Paper Specifications to the Joint Committee on Printing, are mandatory for use by all government departments, including the Field Service. The conformity of Navy Specifications with the foregoing renders such specifications more in harmony with those of all other government departments, and eliminates different requirements for the same type of material. For such items as are not covered by Federal Specifications, special requirements are set up based upon standard commercial practices embodying the results of laboratory tests, or wherever applicable, the Simplified Practice Recommendations of the United States Department of Commerce are followed. Under this category some such papers as gummed tape, paper tags, paper bags, waterproof papers, corrugated paper are included.

The specifications for paper as now in use are divided into two parts:

1. The technical requirements which cover the physical, chemical, and microscopical tests. These tests are intended to ascertain the quality and character of the fiber used, and the general characteristics such as strength, weight, amount of filler, sizing, and folding endurance.
2. Standard samples which show the desired characteristics of color, finish, formation, and cleanliness.

Evaluation of Papers

To evaluate papers correctly is not a simple matter. An approximate estimate of paper can be formed by the handling of paper and visual inspection for certain qualities. An expert, however, is required to form opinions on this basis and such opinions lack the fundamental basis of numerical expression, which is necessary particularly in making comparative tests. In this connection the Forest Products Fellowship of the American Paper and Pulp Association in one of its reports states that "to evaluate a material is to determine its fundamental properties and express results in numbers technically correct." Accordingly, most of the important properties of paper are measured with the aid of special instruments constructed for this purpose. Papers are also examined chemically as to their material composition, and microscopically as to the fiber content. Serviceability tests are performed also wherever necessary, as, for example, with carbon papers. In connection with the latter, new standards are under consideration, the subject matter of which will be discussed in a later paper.

As regards the physical properties of paper, bursting strength is an important test; although it is not regarded as significant as heretofore. It is, however, a valuable test and is especially useful for comparison of different papers. The test is very easily and rapidly conducted and operates by measuring the resistance to pressure in terms of pounds per square inch necessary to burst a hole into the paper. The result is registered on an accurate Bourdon tube-type gage, the readings of which are designated as points. The newest instruments for this purpose are motor-driven and have a capacity up to 1000 pounds. In performing the test, individual fluctuations are taken into consideration and an average of ten

tests is ordinarily recorded. In the event of the necessity for a rejection, an average of forty tests distributed over as large an area as possible is obtained.

Tests for folding endurance are recognized as an important criterion of the physical quality, this test being regarded as one that will frequently reveal inherent defects in papers. A good folding test indicates fibers of the highest quality beaten and felted together in the most skilful manner. Moreover, folding endurance greatly increases with rag content and rag quality. The longer the fibers from which the paper is made, the higher folding endurance the paper will have. The quality indicated by such tests is especially important in papers that are subjected to a great deal of handling.

The weight per ream is determined on all deliveries of paper by means of a Quadrant Paper-Weighing Scale accurately calibrated so that a sample cut to any convenient size and accurately measured records the proportionate ream weight in pounds. A variation above or below the ream weight of not more than five per cent is allowed. For ordinary papers the ream weight is easily obtained, but for special papers, such as carbon paper, an apparatus must first be used to remove the carbon, etc., so that the basic weight of the paper may be obtained. It is possible by this method to differentiate between a four and a four and one-half pound per ream paper with accuracy.

Transparency and Other Tests

While bursting strength, folding endurance, weight, etc., are important tests for certain purposes, other tests are of equal importance. For example, in tracing papers, the degree of transparency is an important factor inasmuch as such papers are used in drafting work in connection with the tracing of blue prints. The test for this purpose, which is known as the opacity test, is carried out in an especially constructed photometer which measures the amount of opacity. The measurement is based upon the "contrast ratio" of light reflected, which varies from zero for a perfectly transparent material to unity for a perfectly opaque material. Pure cellulose, which enters into the composition of paper, is inherently a perfectly transparent substance. The optical impression of opacity is only obtained as a secondary phenomenon, depending on the scattering of light from innumerable discontinuous surfaces in the structure of the mass.

Measurements of the degree of finish of certain papers are performed by means of a glarimeter which determines the per cent of gloss. The instrument, which is also a photometer, operates by determining the fraction of light reflected from the papers at an angle of 57.5 degrees, which is polarized. The test is being used for comparison of deliveries with standard samples, in order to obtain some information as to the color, finish, and formation, which are now an important part of the specifications.

Microscopic and Chemical Tests

Fiber analyses are conducted microscopically, the various kinds of fibers and the relative proportions of each being determined with the aid of standard stains. The estimation of such fibers as rag, sulphite, soda, sulphate, ground wood, jute, and manila is carried out as required. The presence of ground-wood pulp is barred from most papers due to the fact that such fibers carry the lignin which causes deterioration in time. Qualitative tests for ground wood are based upon identification of the lignin by means of phloroglucinol or some similar reagent. In papers that are used only for temporary purposes such as towel paper, ground wood is permitted up to a certain percentage. The grade of the fibers, i. e., the quality of the sulphite or rag fiber used cannot be evaluated by this method, so that specifications should provide for other tests as far as possible to ascertain whether the finished paper corresponds in quality to the grade desired. It should be borne in mind that there may exist wide variations in quality between papers having similar fiber content such as an all-sulphite or all-rag paper, depending upon the quality of the fiber.

Chemical tests on papers involve the determination of such constituents as loading materials, rosin, glue, sizing, etc. Acidity in terms of the hydrogen-ion concentration is determined for some of the better grades of papers in an effort to insure the keeping qualities of such papers. The methods used in conducting such determinations are the official methods set forth in the specifications which are the standard methods used by all government departments as well as those of the Technical Association of the Paper and Pulp Industry. Such factors as copper number and alpha cellulose are being studied for future purposes.

An important consideration in connection with the purchase and storage of paper is its liability to deteriorate. Some papers deteriorate more rapidly than others, and in this connection the Bureau of Standards is at present conducting extensive research investigations in order to obtain more definite information as to the exact qualities which make paper resistant to deterioration. Several papers along these lines have already been published, but as yet there are no official tests established by means of which such information can be definitely obtained. The percentage of alpha cellulose appears to be a significant factor in this con-

nection, and researches are accordingly being conducted in this direction.

As regards the life of a paper that is to be stored, the proper conditions of storage are important for the preservation of the paper. Bureau of Standards Circular 70 states in this connection that

> "papers should be stored in a room free from direct sun light, free from fumes of illuminating gas or the products of combustion therefrom, and also free from acid fumes and dust. The room should have a good circulation of air, which is kept moistened to prevent brittleness of the paper, due to excess dryness."

Standard Samples

The significant thing as regards the application of the system of purchase by specification-standard sample, is the elimination of guesswork particularly in such considerations as color, finish, formation, and cleanliness, the standard sample representing the quality that must be furnished in these respects at all times. With the aid of such standard samples, together with the detail requirements as set forth in the specifications, such requirements having been made as explicit as is technically possible, it will be possible to maintain a standard quality for all papers. Furthermore, the use of standard samples insures the fact that satisfactory paper can be obtained again in the same quality at any future date. The new system of purchase by standard sample does not as yet cover all types of paper used, such special items as carbon paper, waterproof papers, paper bags, etc., being under consideration for future inclusion. It is believed that, as a result of the present restandardization, greater economies will result in the purchase of various papers. A more rigid adherence to specifications, as regards deliveries, is being maintained in carrying out this objective.

Bureau of Standards Publishes Formulae of Polishes

The formulae and description of methods of preparation of various types of polishes are contained in Letter Circular 275 which was issued by the Bureau of Standards in December, 1929. The circular, consisting of 15 mimeographed pages, will be useful to those who wish to prepare specifications of polishes for furniture and automobiles, metals, floors, glass, stoves, and shoes.

The preparation of polishing cloths is also described.

The circular includes a valuable bibliography.

Federal Trade Commission Approves Standardization

As the result of a rumor that the Federal Trade Commission would rule adversely on simplified practice recommendations drawn up by 120 industrial groups under the auspices of the Division of Simplified Practice of the U. S. Bureau of Standards, the Commission has made public an announcement of its commendation of simplification and standardization work as a trade association activity. The Commission had previously stated its favorable attitude toward standardization work. In a report to the Senate on "Open Price Trade Associations" (Senate Document 226) submitted several years ago, the Commission said:

> "Some of the most valuable kinds of association work may be classed as measures looking to greater economy and efficiency in business. Among these are standardization, simplification, and grading and inspection. In general, standardization and simplification and related movements should tend greatly to lower distribution costs—a development much to be desired."

Austrian Standards for Hospital Equipment

The American Standards Association has received copies of draft standards developed by the Austrians for a number of hospital articles. The Austrian and German committees are particularly active in this field and will in time have an extensive set of "engineering" standards for all sorts of hospital supplies, materials, equipment, and appliances. The items usually include both a standardization of type and dimensions, and of specifications for materials. Recent drafts are: rubber air cushions; air cushion pump (bulb type); ice bag made of cloth, rubberized on both sides; hard-rubber valve with tube (for irrigation, etc.); and water pillows (800 × 900 cm).

Irish Farmers Standardize

Standardization is being used as one means of improving the conditions of Irish farmers, according to an article by James Winder Good in a recent issue of the *New Republic*. P. J. Hogan, the Irish Minister for Agriculture, he says, is seeking to institute more effective standardization in order that Irish products may be "consistently good and not occasionally excellent."

Progress in the Field of Hospital Standardization in Germany[1]

by

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American Standards Association

Beds, surgical instruments, hospital linen, and methods of disinfecting and cleaning standardized by special committee

Is it necessary to have fifty different types and sizes of beds for children?

The German doctors and hospital experts, joining the national standardization movement which has developed strongly since 1918 under the auspices of the German Standards Committee, have firmly answered this question in the negative. Two types of children's beds will do, they have decided, one having a size of 100 by 65 centimeters (about 40 by 26 inches), and the other one, of simpler construction, a size of 90 by 50 centimeters (about 36 by 20 inches).

Children's Beds Now Uniformly Designed

When ordering the former type, the buyer need only mention the standard designation, "Child's bed 100 by 65 FANOK 8,"[2] and indicate the material of the top bar of the sliding part and whether hardwood feet or casters are desired. The further details are laid down on the standard sheet, which gives the main dimensions for the bed. The text specifies, for example, that each of the vertical end portions shall be 115 centimeters high, including the hardwood feet, and shall consist of a piece of cold drawn seamless steel tubing (outside diameter 26 millimeters, wall thickness two millimeters), curved at the corners to a radius (measured on the inside of the curved portion) of 120 millimeters, with a cross-connection made of the same kind of tubing (outside diameter 13 millimeters, wall thickness one millimeter), arranged at a height of 58 centimeters above the floor. Between this cross-connection and the top of the main tube, seven vertical 8-millimeter steel bars are arranged, an opening of about 7.5 centimeters being left between each pair of bars. In addition to this, the sheet also specifies details of the other portions of the bed, such as the manner in which they shall be assembled. It also states that the bed shall be white enameled, that it must allow of being disassembled and that the component parts must be interchangeable.

The result of this standardization work is the same as has been demonstrated for years in standardization applied to industrial products and processes. Children's beds can now be made cheaper because of their uniform design. They can be made for stock, thus making it possible to distribute the load on the manufacturing plant more equally, and moreover guaranteeing that the cribs will be readily available. Dimensions and consequent space requirements are definitely known in advance. And last, but not least, nobody has to spend any further thought on how to design a good child's bed, for the committee that set up the standard design will also closely watch the possibility for any improvement in it by considering suggestions made to this effect and by keeping abreast of scientific research.

Trends of the Machine Age

To some persons who are apt to worry about the question of where our machine age is going to lead us, the similarity between the trend toward standardization in the care for the sick and in matters of industrial production may seem disturbing. They will feel that perhaps never does a patient need a personal note so much as when he is under a physical or psychical depression. "Is it proper," they ask, "to deal with equipment and materials for the treatment of patients in hospitals and sanatoriums in the same way as with machinery for making bolts and nuts or standardized automobiles?" Curiously enough, there is a striking similarity, from the viewpoint of standardization, between certain aspects of the development of care for the sick and of the development of industrial production.

[1] Reprinted from the April, 1931, issue of *The Modern Hospital.*

[2] The word FANOK is an abbreviation of the name of the Special Committee on Hospital Standards, its full name being *Fachnormenausschuss Krankenhaus.* It appears on all national standards developed by the committee and approved by the German Standards Committee—*Deutscher Normenausschuss.*

Both have necessarily started in the home and have outgrown it, the equipment, both industrial and medical, having become too special and too costly to be available to the average individual. Most medical equipment requires experts to operate it and its use is too temporary, under "normal abnormal" conditions, to pay a return on its investment.

The average patient could afford an x-ray plant for investigating his possible physical defects as little as he could afford a machine for manufacturing his own shoes. He could not run either, nor would either pay its way, because the time of actual use would be too short. Progress and its resultant conditions have in both cases transferred the original home occupation to the "serial" or even "mass production" unit. In this connection it is interesting to note that some years ago Sullivan W. Jones, then the architect of New York State, likened a hospital to a production plant, the sick received by it being, figuratively speaking, the "raw material" to be transformed into persons leaving it in improved condition, as the "finished product."

The Military Influence

Another trait common to hospital and industrial standardization is the share that military technique has had in their development. Wholesale "repair" or "salvaging" of human material in warfare required in principle the same measures as wholesale production in industry. Requirements of uniformity to make possible standard handling and standard instructions in handling, the interchangeability of units and mass supply always were factors of primary importance to military hospitals and ambulances, for the same reasons that they were important in the manufacture of rifles, ordnance, ammunition, and other destructive equipment and materials, whose production had considerable influence on the development of industrial standardization. Thus, one of the early examples was the manufacture of 10,000 muskets by Eli Whitney, as far back as 1798. He made them of interchangeable parts, that is, each component part could be taken at random from its lot and would always fit, a performance unheard of up to that time.

So, after all, there is no essential difference in the application of the technique of standardization to hospitals and industrial plants. Where type, size, and details of equipment, including such items as furniture and clothing for patients and nurses, medical instruments and materials, can be unified, there is a direct benefit to all parties, both from an economical and technical point of view. Diversity, solely due to special wishes of different individuals or groups, is contrary both to economy and efficiency in operation.

A great difficulty in standardizing, and this applies both to the hospital and to the factory, is to draw the dividing line between what should be unified according to the principles already outlined, and what should be left to the decision of the individual expert, who in the case of the hospital is primarily the doctor. This factor influences such questions as the standardization of medical instruments. In some cases, these must possess certain "personal" features, because of the findings made by a specialist or because of the mere requirements of the element of handicraft in the profession. Standardization must refrain from touching such objects, just as it must not touch certain tools used by an artist or sculptor. But there is no good reason why the specifications for a pair of bandage scissors, useful but not directly tied up with changes in the medical art *per se*, should not be laid down on a standard sheet.

In this connection it is interesting to quote here British expert opinion on this matter, as voiced in "The Standardization of Surgical Dressings" in the issue of the *Medical Press* (London) of September 10, 1930:

> "The subject of standardization of medical supplies in general is one that should be given more thought than it gets. Every hospital finance committee is familiar with the extra expense incurred as a result of the individual preferences of this or that member of the staff for special modifications of some widely used apparatus or medicament. It is perhaps a result of the variety of modifications which the instrument maker has to manufacture that the price of his ware is so high. He has to make so many modifications that he cannot afford to sell even the commonest and simplest piece of apparatus, such as a binaural stethoscope, except at an inflated price."

The German committee has seen its way clear so far to declare some fifty instruments used in medical surgery as being fit for standardization. These instruments will be specified on national German standard sheets,[3] now in the course of development.

Organization of Work

The work on hospital standardization is carried out in Germany by a special committee, jointly sponsored by the administrations of the municipal hospitals and other health services in the most important cities and those of private hospitals and sanatoriums. The German Standards Committee, under whose auspices the work is carried out and which finally approves the standards developed, is a national organization

[3] These will be available (loan or sale), when definitely issued, from the American Standards Association.

that started its work in 1917 in the field of pure engineering standardization, more particularly in the mechanical industry, and has since extended its activities to include also standardization problems of the ultimate consumers of goods, the household, business offices, and hospitals.

The FANOK had an interesting booth at the hygiene exhibition held during the summer of 1930 in Dresden, as illustrated partly by the accompanying pictures. These will be explained here in connection with a brief review of the scope of the work that is now in course of development in sixteen working committees of the FANOK, each one of which is dealing with one of the following subjects:

FIG. 1

German Standard Child's Bed (Large Size) for Hospitals

1. Surgical instruments—The exceedingly large variety in the same type of instrument has led to an effort to establish standard types and sizes. Of course, this does not apply to instruments that are used in rare cases or only by a few surgeons. The standards established for surgical instruments are kept as closely as possible to the existing types, preference being given to types that have appeared to be practical or are much in demand and are frequently ordered. Draft standards have so far been published for knives, scissors, saws, and pliers. Part of these drafts will be issued in the near future as German standards. Their introduction must be a gradual one since the firms supplying the instruments will need time to adapt their manufacturing equipment to the production of the new types and sizes.

In addition to the usual advantages of standardization, consisting in the elimination of superfluous types, facility in obtaining replacement parts, and avoidance of duplication in design work, a special advantage in this case is that the instruction of the students in the use of the instruments is facilitated.

A number of instruments were exhibited in the show case which is illustrated here. One of the items on exhibit was a series of injection needles with the following standard lengths: 20, 25, 30, 40, 50, 70, 100, and 120 millimeters; and the following diameters: 0.4, 0.5, 0.6, 0.7, 0.9, 1.10, 1.50, 1.80, 2.00, and 2.40 millimeters.

2. Auxiliary hospital buildings—In times of epidemics in Europe, frequent use is made of buildings of simple construction to house the unusually large number of patients, these buildings being removed after the end of the epidemic. Buildings of this kind are also sometimes used as temporary extensions of the main hospital, for example, pending the completion of new wings, or even as permanent extensions of the latter.

Draft standards for temporary (portable) auxiliary buildings have already been published, while work on permanent auxiliary buildings has been started.

3. Hospital linen, underwear, and clothing—The task of this subcommittee is in the first place to standardize the textile materials used in large quantities in hospitals and to determine the kind of material of which the different types of underwear, sheets, and clothing shall be made. The dimensions of the objects in question are also laid down in the standards.

Before standardization, the variety in textile materials was great. After standardization, eight different materials appeared to answer the needs.

Among the items exhibited were: towels for adults and children, respectively; bath towels; towels for the operating room; kitchen towels; glass towels; dish towels; dresses for male and female patients; gowns to be worn by the doctors during their visits; aprons for nurses; dresses for male nurses and for operators of the mechanical plant of the hospital; a woolen blanket for use in solariums. Several of these items appear in the accompanying pictures.

Disinfecting Apparatus

4. Disinfecting and cleaning—A standard sheet has been established for a stationary steam disinfecting apparatus with a nominal capacity of 4 cubic meters (4000 liters), shown here. Standards for other apparatus and for disinfecting and cleaning utensils and agents are in the course of development. The scope of the work includes autoclaves; hot air sterilizers; laundering apparatus; materials and apparatus for cleaning and disinfecting; accessories for disinfecting apparatus; vehicles for transporting

infected and disinfected objects; and furnaces for burning waste and soiled materials.

5. Electromedical apparatus—Work in this section is performed in cooperation with the standards committee of the German X-Ray Society. The latter has so far published rules for the protection of doctors and technical personnel against high voltages in medical x-ray plants, and rules for their protection against radiation in such plants.

How Furniture Has Been Changed

6. Tableware, kitchen utensils, and equipment for the transportation of food—Standards have been established for containers for transporting food, with contents of 2, 3, 5, 10, 15, 20, 30, and 50 liters, and for transporting cans (with and without a spout) for solid and liquid foods, with contents of 2, 3, 5, 8, 10, 12, 15, and 20 liters. A collection of such containers and cans is shown in one of the accompanying pictures.

7. Hospital furniture—Before standardization in this line had been started, the different hospitals, and also the different manufacturers, had their own types of beds for patients, varying in regard to material, design, and dimensions. This statement also applies to beds for babies, children, and hospital personnel; to night tables; to bed shifters (caster attachments); and to steel, wooden, and reclining chairs. These objects were usually supplied in accordance with the special wishes of the purchasing hospitals and the practical experience of the manufacturers. Under the auspices of the FANOK, a large group of doctors, hospital administrators, and manufacturers of hospital furniture met for the first time to discuss the problem on the basis of the essential requirements. In thus developing standard types, the justified wishes of the doctors were given more consideration than they ever had received before. Also, length of life and substantial construction of the furniture were given special attention. The number of hospital beds for youths and adults was reduced from about 100 different types to one type in two sizes; children's beds from about 50 types to two; night tables from about 50 to one; wooden chairs from more than 100 types to two.

8. Articles used in caring for the sick—Work on this subject has been started by establishing basic rules for the manufacture of rubber articles and test specifications for determining their quality.

9. Ambulance automobiles—The need of unifying the design of ambulance automobiles had been felt for a long time. The existing types of hospital automobiles differed greatly in appearance, but a still greater drawback was the diversity in their internal arrangement. Also, the comfort of the persons to be transported often appeared to have been given attention with entire neglect of such important hygienic requirements as, for example, the facility of disinfecting the interior of the car. A standard has now been established for an ambulance automobile suitable for transporting four patients in lying position, while an automobile for two patients will be standardized next.

10. Foodstuffs—The scope of the work on this subject includes the establishment of quality specifications both for the raw materials for foodstuffs supplied by agriculture, cattle farming, and horticulture, and for the finished products—foodstuffs ready for consumption—supplied by industry. It also includes the study of the use of foodstuffs in its application to the care of the sick.

Obviously, this part of the work is difficult even though it does not aim at the study of, and the establishment of standards for, the individual foodstuffs. This would be too extensive and too complicated a problem to be tackled with any hope of attaining practical results within a reasonable period of time. The basic idea is rather to standardize general requirements applying to certain classes of foodstuffs, such as preserved vegetables and fruits, cereals, dairy products, fats and oils, non-fermenting juices of grapes, and other fruits and spice products. Each of these groups requires further subdivision into sections, each of which often has to be dealt with by special experts. Essentially, the work on this entire group of subjects comes down to giving an answer to two basic questions: (1) What should the quality of a specific foodstuff be in order to attain a rating of 100 per cent? (2) How should such a foodstuff be prepared?

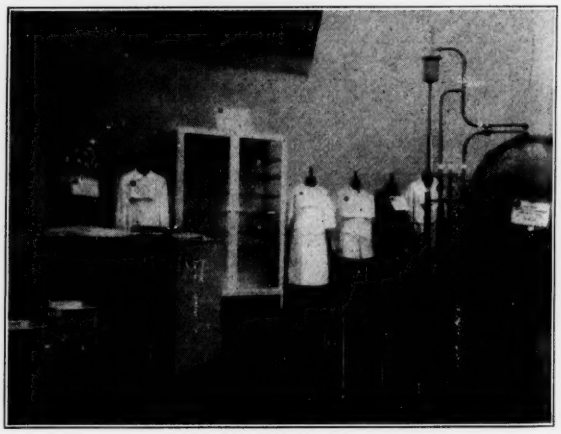


FIG. 2

Standard Dresses for Nurses, Showcase with Surgical Instruments, and Disinfecting Apparatus, Shown at Hygiene Exhibition, Dresden, 1930

In addition to questions relative to the food-

stuffs themselves, there are problems regarding hygienic kitchen equipment and utensils, the manuring of vegetables, and the principles to be observed in operating a special diet kitchen, as part of the hospital kitchen in the more general sense, both for the benefit of the patients in the hospital and of convalescents who have already left it.

Because of the complicated nature of the subjects in this group, no standards have as yet reached the final stage. Most advanced is the work on preserved vegetables and fruits, on kitchen equipment, and on a recommended practice for diet kitchens.

11. Furniture for the rooms of the hospital personnel—If it is possible to establish certain standard rules for furnishing the rooms of doctors, nurses, and other hospital personnel, the long deliberations that often take place to settle this question in each individual case will become superfluous. The subcommittee on this subject visited a number of recently built hospitals, with the purpose of laying down, on standard sheets, the general dimensions of the several pieces of furniture required, together with the manner in which they shall be made. A draft standard has been published giving the dimensions of the following furniture for the room of a female nurse: large cabinet, small cabinet, washstand, night table, round table, and mirror. Draft standards on furniture for doctors' and personnel rooms will follow.

12. Vehicles for invalids—Work on this subject has been started upon the instigation of the German Department of Labor. It concerns vehicles for transporting persons who, temporarily or permanently, are unable to walk, the vehicles being moved either by the invalids themselves or by others, and being intended for indoor or for outdoor use.

The purpose of the work is the standardization of definite types of vehicles and of their component parts, such as hubs, bearings, spokes, rims, and tires, in order to obtain ready replacement of parts through interchangeability and their being generally available from stock. No standards on this subject have been issued as yet.

13. Special requirements of asylums and sanatoriums—Draft standards have been worked out for a special type of bed for restless patients, and for a special type of wooden chair. It was found that the standard beds for adults and young persons, for children, and for hospital personnel, adopted for use in hospitals in general, were suitable also for asylums and sanatoriums. The standard type of personnel bed was even found to be adaptable to the needs of the large number of passive patients cared for in institutions of this kind, who are not confined to their beds all the time they are in the institution.

With regard to chairs, matters are slightly different. Whereas one type tentatively standardized for the ordinary hospital was found to be suitable also for asylums and sanatoriums, another type was considered too heavy for the latter. Therefore, a special type was developed (standard now in draft form) for special use in working rooms and in such places where a higher degree of stability of the chairs is required by the condition of the patients, than is the case in the ordinary hospital.

FIG. 3

Standard Containers and Cans for Transporting Food, and (on Table) Samples of Standard Textile Materials, Shown at Hygiene Exhibition, Dresden, 1930

14. Dressing cabinets—Great variety in types and sizes exists in this field, and standardization will answer a general need of unification. Moreover, few of the present types are of sound design. The scope of the work includes standardization of the general principles governing the type, the shape, the size, and the contents of dressing cabinets for different purposes.

15. Surgical dressings—The main purpose is here to bring about a considerable reduction in variety of dressings, especially with regard to surgical cotton. Whereas before standardization there existed innumerable kinds of this commodity, only four have now been left. The varieties in dressing gauze have been reduced to about one-third of those commercially available.

16. Preprinted forms—Standardization of the form and arrangement of diagrams and reports makes it possible to make preprints for these items. This also greatly facilitates the comparison and tabulation of results. So far, seven "curve sheets" have been standardized, as, for example, one for clinical observation and one for use in sanatoriums for tuberculous patients. Other types of printed forms are in the course of development.

ASA Publishes 1931 Issue of Year Book

The American Standards Year Book for 1931 has been published by the American Standards Association and the distribution of 25,000 copies of the Book is now under way. In addition to a review of the activities of the American Standards Association during the past 12 months, the Year Book describes developments in international standardization and also the cooperative activities of trade associations, technical societies, and government departments in national standardization work in this country.

In a review of the year's activities, the Year Book lists five new Member-Bodies which have joined in the direction of national standardization activities under the auspices of the American Standards Association. These new Member-Bodies are:

Institute of Radio Engineers

Light Metals Group, including Aluminum Company of America

Manufacturers Standardization Society of the Valve and Fittings Industry

Radio Manufacturers' Association, Inc.

U. S. Government Printing Office

With these organizations, there are now represented on the ASA Standards Council 45 technical societies, trade associations, and federal government departments.

Many important standardization projects were initiated during the past year under ASA procedure, according to the Year Book. These projects include the standardization of foundry equipment, specifications for sieves for testing purposes, approval, and installation requirements for domestic gas burning appliances, and a code for the prevention of dust explosions in coal pneumatic cleaning plants.

Several new safety codes were added to the large group of safety standards being set up under ASA auspices for the guidance in accident prevention work of practically all branches of industry. Among the new codes are safety code for mechanical refrigeration, recommended practice for the use of explosives in bituminous coal mines, the standard for fire-fighting equipment in metal mines, and safety code for woodworking plants.

One hundred eighty-five standards, including 46 during the past year, have been approved by the American Standards Association, and 178 uncompleted projects are now under way. Over 2200 individuals representing 400 national organizations are represented on the ASA technical committees in charge of these projects.

The Year Book includes a foreword written by Charles F. Kettering, president of the General Motors Research Corporation.

Chart Shows Organization of U. S. S. R. Standards Body

A chart of the administrative set-up of the All-Union Standards Committee of the U. S. S. R. contains much interesting information on the organization of the official Russian standardizing organization, which is one of the largest national standardizing bodies. The committee is divided into the following sections: planning and economic, scientific and technical, military, organization and control, and popularization and press. There is also a "Main Chamber of Weights and Measures" with 28 research laboratories.

Other divisions are: the International Bureau, the Simplification Committee, and the Supreme State Quality Inspection, with subdivisions for coal, naphtha, metals, and chemistry. A "Scientific Terminology Commission" is part of the Scientific Technical Section. In addition, there are the following standardization groups: power, mining and fuel, metallurgy, mechanical engineering, agricultural engineering, shipbuilding, automobiles and tractors, electrical industry, chemical industry, welding, building materials, building standards, transportation, precision mechanics, textile, clothing, leather and footgear, wood-working, paper and printing, ceramics, agriculture and foodstuffs, sanitary and medicinal, safety codes, and general standards.

The organization chart is accompanied by a diagram showing graphically the increase in the number of approved standards and the number of copies of standards distributed. According to this diagram, the number of approved standards grew from 42 in January, 1927, to 1958 in October, 1930. One hundred and twenty thousand copies of standards had been distributed up to January, 1927, and this number was increased to 9,689,800 by October, 1930.

Army Specifications Available

A set of U. S. Army specifications covering electrical equipment has been received by the ASA Information Service. These specifications include provisions for transformers; cable terminals; tubes; fixed capacitors; telephones; radio receivers and transmitters.

Copies of the specifications are available for loan through the office of the American Standards Association.

Standardization a Recognized Means of Stabilizing Employment

Standardization of industrial products permitting manufacture to stock was pointed out as an important means of stabilizing employment during periods of seasonal and cyclical depressions by the American section of the International Chamber of Commerce in a recent report on employment regularization. The report was prepared by a committee of six outstanding business executives for submittal to the International Chamber.

> "Even though it may be impossible accurately to predict the anticipated volume of sales a year in advance," the report states, "it is still practicable to minimize periodic fluctuations in production through manufacturing for stock. This device, of course, can be applied only in the manufacture of standardized products. It is peculiarly well adapted to the production of articles which are not subject to rapid deterioration, obsolescence, or style changes."

The stabilizing influence of industrial standardization has been frequently pointed out by the American Standards Association and other bodies. Perhaps the most notable example of stabilization of employment in a plant producing a standardized product is the national lamp works of the General Electric Company, where 50 weeks of work during 1931 were guaranteed by the management to employees of not less than two years' service with the company.

Commenting on the action of the General Electric Company, Gerard Swope, president of the company, said:

> "Stabilization of employment is much simpler in those departments where the product has been standardized and where there is less risk of obsolescence and deterioration. The product of the incandescent lamp department is notably one of these. The plan for a guarantee of work under certain conditions is offered as a result of the stabilization of production and employment in the incandescent lamp department. It is hoped that the plan may be continued from year to year, possibly with modifications resulting from experience."

Although the electric lamp represents a degree of standardization which cannot be achieved for many products, almost all manufacturing industries produce many parts which, with proper standardization, could be manufactured to stock during periods of depression even in cases where the assembled product as a whole cannot be standardized.

A survey made last year by the Committee on Stabilization of Industry for the Prevention of Unemployment, appointed by Governor Franklin D. Roosevelt of New York State, provided evidence that manufacture to stock as a means of helping to stabilize employment is already coming into wide use. Of 598 firms which replied to the committee's inquiries, 292 had some plan of stabilization in operation. Of these, 66 reported manufacture to stock as the means employed. Part time employment in operation in 157 plants was the only plan more extensively used. Only seven firms reported definite standardization programs.

In its comment on the survey the committee said:

> "Manufacturing for stock consists of making up goods against anticipated, not standing, orders. This supply is set aside to be drawn upon as orders are filed. Such a procedure is possible with standardized goods and works especially well when the product is also highly seasonal, since it permits fairly even production from month to month. Some firms balanced their staple and seasonal lines by stocking the standard brands in the dull season and making the variable items in the active period. In general, though, the concerns made stock simply on the general prospects of business continuing about the same from one year to another and did not base such production upon careful estimates of future business founded upon past and present records. Therefore a sudden change affects them more adversely than factories watching the market carefully and controlling production accordingly. The latter method makes manufacturing for stock an integral part of forward planning. . . .
>
> "Attention to the products themselves raises the question of standardizing, diversifying, and supplementing the regular articles. Standardization consists of making all the items conform to a limited number of specifications regarding its physical qualities such as size, shape, style, or color. This simplifies the variety of goods to be manu-

factured, thus eliminating some processes in production and permitting stock to be made in advance of orders. Only a very few firms reported that they had reduced the number of sizes, styles, colors, or other variations in products. Firms that did standardize felt more secure in building up stock and had greater success in obtaining early orders. Attempts to establish such a procedure with goods that are stylistic met with more difficulty. Clothing is an outstanding example of this type, but even in this field two companies had made definite progress. Such a program necessarily includes educating the consumer to accept the changes."

Underwriters' Standards for Conduits and Panelboards

by

H. M. Smith, *Associate Electrical Engineer*
Underwriters' Laboratories

A revised edition of Underwriters' Laboratories' Standard for Rigid Steel Conduit was published in April, superseding the edition of November, 1917. The new edition is in bound pamphlet form and involves an extensive rearrangement of the material contained in the earlier loose-leaf edition.

Rigid conduit as a raceway for insulated conductors is a long-established material for electrical wiring. It is a comparatively simple product and one which has been well standardized by the industry. The uses of conduit, manufacturing methods, and installation rules for the material have not changed materially in many years and, accordingly, the actual changes in or addition to requirements for this class are comparatively few in number.

The standard covers finished, rigid conduit as followed-up under the Laboratories' Factory Inspection and Label Service program. It covers the steel product only and does not include requirements for conduit fittings other than the couplings which are supplied with the material.

In common with all the other printed standards of the Laboratories, this standard contains a brief general information section which describes the organization and its methods and contains a condensed statement of the procedure followed by a manufacturer in submitting a device for investigation and listing.

The Requirements Section covers the following items:

General properties and uniformity of steel tubing for conduit and the cleaning and removal of scale from the surface

Enamel and zinc coatings with a description of tests, test methods, and apparatus for use in determining the acceptability of the coatings

Threading and reaming of conduit, elbows, bends, and nipples

Weights and length of conduit and nipples, and radius dimensions of elbows and bends

Final inspection and identifying marking of the finished product

The Follow-Up Section contains a description of the procedure followed by the Label Department of the Laboratories in conducting its factory inspection work, the methods employed in determining that the product complies with requirements, and the manner in which the Laboratories handles its relations with manufacturers subscribing to the Label Service.

The last ten pages of the Standard contain a description of the test procedure followed in making quantitative chemical determinations of the amounts of copper and zinc in coatings on rigid steel conduit.

Among the new items in the Requirements Section are definite lengths for straight conduit, radius dimension for elbows and bends, and the omission of the requirement for the straight tapping of couplings which may now be provided with tapered threads.

Panelboards

A revised edition of Underwriters' Laboratories' Standard for Panelboards was also published in April, superseding the edition of July, 1928.

Panelboards as a class have undergone a number of changes since the publication of the earlier editions of the Laboratories' standard. From open boards with plain bases of slate or marble these devices have developed into more elaborate distribution centers involving dead-front construction and interchangeable units which are adaptable to a wide variety of conditions. The present edition of this standard still contains many items which relate principally to the older types of panelboards, but a number of the requirements have been changed to keep pace with the industry.

The Standard covers finished panelboards as followed-up under the Laboratories' Factory Inspection and Label Service program. It covers both open and enclosed panelboards—the latter in conjunction with the Laboratories' Standard for Cabinets and Cutout Boxes.

The Requirement Section covers the following items:

General design including arrangement of switches and fuses

Materials for bases and the support and spacings of current-carrying parts

Current-carrying capacity of buses

Construction and location of switches, cutout bases, and terminals

Protection of live parts in dead-front panelboards

Insulation, including insulation resistance, barriers, and the sealing of live parts

Panelboard ratings and identifying marking

The Follow-Up Section of this standard is generally similar to the corresponding section of the rigid steel conduit standard, previously described.

Among the new and revised items in the panelboard standard are the following: a requirement that enclosures, wiring spaces, and barriers comply with the Laboratories' Standard for Cabinets and Cutout Boxes; requirements with reference to the point of attachment of a soldering lug overhanging the base, and protection of live parts on dead-front panelboards; and more complete material on the subject of panelboard ratings.

Copies of these standards may be obtained from the Chicago, New York, or San Francisco offices of the Laboratories. The Rigid Steel Conduit Standard is 85 cents per copy and the Panelboard Standard is 60 cents. Copies may also be borrowed or purchased through the ASA Information Service.

S.A.E. Handbook of Standards Published

The Society of Automotive Engineers, Inc., has just issued the new and enlarged 1931 edition of its *Handbook of S.A.E. Standards and Recommended Practices* which has been distributed to members of the S.A.E. and others interested.

The *Handbook* includes new and revised sections relating to screw threads, bolts and nuts, iron and steel, and non-ferrous metal specifications, fuel anti-knock ratings, lubricant viscosity numbers, and also a list of American Standards of interest to the automotive industries.

The first 76 pages of this 1931 edition contain aircraft standards that have been developed by the Aircraft and Aircraft Engine Divisions of the Standards Committee of the S.A.E. These standards cover such things as propeller crankshaft ends and hubs, starter and generator mountings, fuel pump mountings, instrument cases and mountings, spark plugs, storage batteries, tires, rims, wheels and axles, shackles, turnbuckles, rivets, bolts, and extruded aluminum alloy structural shapes.

Among the general standards in the *Handbook* there are many that apply equally to use in aircraft construction, Diesel engines, motor boats, tractors, and agricultural equipment, as well as to automobiles, motor coaches, and motor trucks.

New standards that should prove useful to the manufacturers of Diesel engines, particularly of the automotive type, are a set of Diesel engine testing forms similar to the long-established S.A.E. gasoline testing forms. These new sheets include general rules and instructions for testing, a specification sheet, a log sheet, and four curve sheets for various sizes of engine. These forms may be obtained from the S.A.E. at a nominal price.

The *S.A.E. Handbook* contains a carefully checked, classified list of the manufacturers of products conforming to S.A.E. specifications. This list is classified according to the individual standards of the Society and contains nearly 1000 listings.

Sections of the *Handbook*, such as those relating to iron and steel, non-ferrous metals, bolts and nuts, and lubricating oils, will be very useful outside the automotive industry and members of ASA who are interested may borrow a copy of the *Handbook* for review through the ASA Information Service, or may purchase copies direct from the Society of Automotive Engineers, Inc., 29 West 39 Street, New York, N. Y. The *Handbook* is distributed free to members of the S.A.E., and sold to non-members for $5.00 per copy. The complete iron and steel and non-ferrous metal specifications may be obtained from the S.A.E. in separate pamphlets.

Candy Manufacturer Uses Standard Colors

The conveniences which may result from extending the technique of standardization even to apparently minor matters are illustrated by J. P. Hinde in an article in the *Confectioners Journal*, Philadelphia, on the laboratory work of the Nunnally Company, manufacturer of candy. The company standardized the colors for mints. Customers now make their selections from a color card on which strips of silk show the standard color. Orders are then placed by means of the standard designations.

British Imperial Standards Proposed by Imperial Conference

That industrial standardization is outgrowing national boundaries is shown by two developments which have taken place in the last five years. The first of these was the establishment of the International Standards Association (ISA), a federation of 18 national standardizing bodies, including ASA. The main objects of ISA are to systematize the exchange of information on standardization work in the different countries and to promote uniformity among national standards.

The second development is the decision of the Imperial Conference (of the Prime Ministers of the British Empire) that there should be "common standards . . . in the various parts of the British Commonwealth of Nations." The resolutions of the last Imperial Conference held in London in 1930 call for definite cooperative action among the British, Canadian, and Australian national bodies—which have not joined the International Standards Association. These resolutions are quoted by Percy Good, Deputy Director, British Engineering Standards Association, in the March, 1931, issue of the *Journal of the Institution of Electrical Engineers*, London:

(*a*) The Conference draws attention to the resolution of the Imperial Conference of 1926 in favor of the adoption, where practicable, of common standards, and recommends that the standardization bodies in the various parts of the British Commonwealth of Nations should keep in regular and systematic consultation with a view to the establishment of uniform standard specifications so far as is practicable in their common interests.

(*b*) As part of this consultation, the practice of communicating draft specifications prepared in one part of the Commonwealth, for the observations of the standardizing bodies in other parts likely to be interested, should be continued and extended. It would be advantageous if any proposed specification could be so communicated in draft form at the earliest moment practicable, subsequent modifications being sent, if necessary, by telegram, and if a definite time limit were agreed upon within which the observations of the other standardizing bodies should be furnished.

(*c*) It is further desirable that in the event of users in one part of the Commonwealth not being satisfied with the performance of the goods made to any particular standard specifications issued in another part, the matter should be brought to the attention of the issuing standardizing body in order that the specification in question may be brought under review.

(*d*) Much advantage would result from the communication by one standardizing body to others of any suggestions that it may be able to make from time to time as to commodities in respect of which standardization is desirable. Any such suggestion should be supplemented, where possible, with coordinated information of the views of users and manufacturers in the country from which the suggestion emanates as to the characteristics that are desirable in the commodity in question, and also with information as to the extent of the demand that may reasonably be anticipated in that country when the commodity is standardized.

(*e*) The Conference recommends that the scope of the work of the standardizing bodies should include both standard specifications for industrial materials and apparatus, and codes or rules; in order to simplify the procedure, should modification be required, the actual specifications for materials in connection with any code should be kept separate from the code itself.

Mr. Good also mentions that in view of the widespread character of the work of the British Engineering Standards Association the Council has decided to drop the word "Engineering" from the title. The new name of the Association has not yet been decided upon.

Federal Specifications Board Circulates Specifications

The following specifications have been proposed by the Federal Specifications Board. Those who are interested in reviewing them may borrow copies from the ASA Information Service.

Steel or iron zinc-coated culverts
Hemp twine
Table damask (in bolts)
Manila rope
Cotton table cloths

American Standards Association Approves Amendments to By-Laws

Minor changes in the By-Laws of the American Standards Association have become effective through appropriate actions of the Board of Directors and the Standards Council. These changes, which have been made to facilitate and clarify the routine business of ASA, are as follows:

SECTION 34. Special meetings of the Standards Council may be called by the Chairman, or shall be called by the Secretary upon request of five Councilors.

SECTION 35. The annual meeting of the Association shall be a joint meeting of the Board and the Standards Council, to be called by the President before the close of each fiscal year. Honorary Members and Sustaining-Members may be present and shall have the privileges of the floor but not of voting. At the annual meeting the President, as Chairman of the Board, and the Chairman of the Council, will report accomplishments and plans.

SECTION 41c (new). Not later than July 1 of each year the Chairman of the Council shall select a Nominating Committee of five, whose duty it shall be to nominate one candidate each for the offices of Chairman and Vice-Chairman of the Council. The report of the Nominating Committee shall be communicated to the Council not later than October 15. Nominations may also be made by petition signed by representatives of five or more Member-Bodies. Such petitions shall be presented to the Secretary of the ASA not later than November 15. Not later than November 20 the Secretary shall mail to each Councilor a ballot containing the names of all candidates. The names of the candidates of the Nominating Committee shall be suitably designated on the ballot. On the day preceding the Annual Meeting the Secretary shall declare the ballot closed and shall count and certify the ballot. He shall announce the results at the Annual Meeting. The candidates receiving a plurality of the ballots received for the respective offices shall be declared elected.

SECTION 61a (new). Advisory groups, organized within a particular branch of industry or sphere of interest, may be recognized by the Council as advisors in such matters as the initiation and scope of projects, type of procedure, choice of sponsorships, and kindred subjects.

SECTION 62. The approval of standards shall be by letter ballot of the members of the Standards Council other than *ex officio* members. No individual shall cast more than one letter ballot unless he is appointed a Councilor by more than one Member-Body. Such letter ballots shall provide only for "Yes," or "No," votes and they shall be signed by the Councilor voting. In connection with the letter ballot there shall be mailed to the Councilors a brief outline of the history of the development of the standard, and of the evidence of its acceptability to the groups concerned. All records shall be available for examination by any Councilor or Director.

SECTION 63. Letter ballots on the approval of standards may be ordered by the Standards Council in session, or by the Chairman upon the recommendation of boards or committees authorized by the Council to serve in an advisory capacity for this purpose.

SECTION 81. Amendments to these By-Laws must be proposed in writing to the Secretary of the Association and copies sent by him to each member of the Board of Directors and also to each member of the Standards Council at least 30 days prior to the meeting of the Council at which such proposals will be formally before the Council for review. The Standards Council, or any Member-Body of the Association within 10 days from the date of such Council meeting, may file in writing with the Secretary of the Association for transmission to each member of the Board, its recommendations in respect to the proposed changes. Formal action may thereafter be taken by the Board. Amendments, as finally approved by the Board by a three-fourths affirmative vote of those present, shall immediately become operative except that for matters affecting the work of the Standards Council, concurrence by at least two-thirds of the Council membership shall be required.

ASA Representative in Iowa

Monroe L. Patzig, secretary-treasurer of the Engineers Club of Des Moines, and director of the Iowa Engineering Society, has been appointed representative of the American Standards Association in Iowa. Contact between the engineers and industries in Iowa and the American Standards Association will be established through Mr. Patzig, and a complete file of all ASA standards and publications will be maintained in Mr. Patzig's office for local reference.

Amendments to Constitution before Member-Bodies

Eight amendments to the Constitution of the American Standards Association have been submitted by the Board of Directors to the Member-Bodies for ratification.

The most important proposed change is that increasing the number of elected members of the Board of Directors from 9 to 15, in order to have a greater number of Member-Bodies represented on the Board, and in closer contact with its work.

The following are the sections of the Constitution which it is proposed to amend, the additions being indicated by the use of italics, and deletions by the use of parentheses:

SECTION C 6. There shall be (five) *three* classes of members: Member-Bodies, Honorary Members, (Directors, Councilors) and Sustaining-Members, as defined in Sections C 7, C 8, (C 9, C 10) and C 11.

SECTION C 9 to be deleted.

SECTION C 10 to be deleted.

SECTION C 16. A secretary, *and* (or) other *administrative* (executive) officers of the Association, who shall not be members either of the Board or of the Standards Council, shall be appointed by the Board of Directors.

SECTION C 17. The executive, financial, and general administrative functions of the Association, but not the function of approving standards, shall be vested in a Board of Directors consisting of the President, the Vice-President, the Junior Past-President, the *Chairman of the Council, the Junior Past Chairman of the Council,* and (nine) *fifteen* elected Directors, *five to be elected each year.*

SECTION C 18a (new). *The Board of Directors may elect an Executive Committee of its members to whom it may delegate ad interim the full authority of the Board.*

SECTION C 19a (new). *There shall be a Chairman and a Vice-Chairman of the Standards Council who shall perform the duties usual to these offices. They shall be elected by the Council from its membership as provided in the By-Laws. They shall serve for one year or until their successors are elected.*

SECTION C 24. Amendments to this Constitution must be proposed in writing *to the Secretary of the Association and copies sent by him to each member of the Board of Directors, and also to each member of the Standards Council* at least thirty days *prior to* (before) the meeting of the *Council* (Board of Directors), at which *such proposals will be formally before the Council for review. The Standards Council, or any Member-Body of the Association, within ten days from the date of such Council meeting, may file in writing with the Secretary of the Association for transmission to each member of the Board its recommendations in respect to the proposed changes. Action may thereafter be taken by the Board, the* (they are to be voted upon, this) vote to be upon the amendment as originally proposed or as further amended at the meeting. *The amendments as finally* (if) approved by three-fourths of those present (they) shall be referred to the Member-Bodies and shall become operative only when they have been approved by three-fourths of the Member-Bodies.

The amendments have been recommended unanimously by both the Board of Directors and the Standards Council.

C. E. Skinner Represents ASA on Council of ISA

The Board of Directors of ASA has appointed C. E. Skinner, Assistant Director of Engineering of the Westinghouse Electric & Manufacturing Company, Member of the Board and Past-Chairman of the American Engineering Standards Committee (now ASA), as its representative on the Council of the International Standards Association (ISA). The three-year term of Mr. Skinner's membership runs from January 1, 1931.

The Council of the ISA, which is a federation of 18 national standardizing bodies, is composed of the president of the ISA and six other members, each representing a national standardizing body. C. Hoenig, chairman of the Swiss national body, is now president of the ISA, and the six members of the Council represent Italy, France, Holland, Russia, Denmark, and the United States.

A. R. A. Issues List of Publications

A price list of publications issued by the American Railway Association has been received by the American Standards Association. The publications, which include specifications, reports of results of tests, and general proceeding reports and instructions, are listed under the following headings: operating division; telegraph and telephone section; safety section; protective section; medical and surgical section; freight station section; transportation division; engineering division; electrical section; signal section; mechanical division; miscellaneous publications; committee on automatic train control.

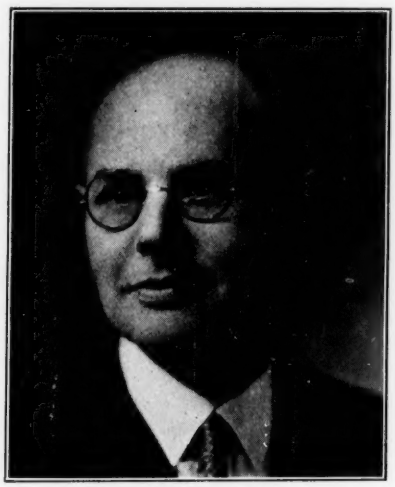
A copy of the price list is available for loan through the ASA office.

Engineers Join Staff of the American Standards Association

The appointment of Horace M. Lawrence as Mining Engineer on the staff of the American Standards Association and S. W. Benham as Assistant Engineer has just been announced.

Mr. Lawrence will have supervision of all the mining, chemical, and ferrous and non-ferrous metallurgy projects being developed under the procedure of ASA. Mr. Benham will assist in the supervision of civil engineering and transportation projects.

Mr. Lawrence comes to ASA from the International Agricultural Corporation where he was employed as mining engineer. He is a graduate of the Massachusetts Institute of Technology where he received the degree of B.S. in mining and metallurgy. He also studied at the University of Nevada where he took graduate courses in physical chemistry. He has been engaged in mining and engineering in Montana, British Columbia, Idaho, and Utah, and was with the Kennecott Copper Corporation, Alaska, successively as chemist, leaching plant foreman, experimental engineer, metallurgist, and superintendent for the concentrating mills of the company. From 1924–1930 Mr. Lawrence was connected with the U. S. Bureau of Mines as associate metallurgist doing research in flotation and new uses for silver, and as



H. M. Lawrence

metallurgist in charge of research in zinc metallurgy and in charge of research on the beneficiation of Florida phosphate ores.

Mr. Benham was graduated from Purdue University with the degree of Bachelor of Science in Civil Engineering. He has had several years of experience in research with the Portland Cement Association where he studied the properties of Portland cement concrete with a view to broadening the use of the cement. Before coming to ASA, Mr. Benham was concrete engineer in the Research and Development Department of the Johns-Manville Corporation.

S. W. Benham

While with the Johns-Manville Corporation, Mr. Benham studied the effect of celite as an admixture of concrete. He was co-author of a paper on "A Study of the Flow-Table and the Slump Test" which was published in the *Journal of the American Concrete Institute.*

The appointment of these two engineers to the staff of the Association follows the resignations of F. J. Schlink, formerly Assistant Secretary, and C. E. Darling, formerly Assistant Engineer.

German Specifications for Red Fiber in Sheets and Rolls

Some Sustaining-Members may be interested in specifications for red fiber in sheets and rolls (Pressspan), specifications jointly prepared and used by the Allgemeine Elektrizitäts Gesellschaft[1] and the Siemens-Schuckert Works (mentioned in the article in the January ASA BULLETIN "Company Standardization as Developed by the Siemens-Schuckert Works in Vienna"). This is a standard sheet prepared in exactly the same form and arrangement as are the national standards sheets of the German and Austrian standards committees. It includes general requirements, chemical properties, the form in which the material is ordered, permissible dimensional variations, mechanical properties, electrical properties, taking of samples, and packing.

[1] The German General Electric Company.

	When installed									At replacement				
	Treated poles					Untreated poles				Treated or untreated poles				
	For ultimate fiber stress of—					For ultimate fiber stress of—				For ultimate fiber stress of—				
	7,400	6,000	5,600	5,000	3,600	6,000	5,600	5,000	3,600	7,400	6,000	5,600	5,000	3,600
At crossings:														
Poles in lines of one grade of construction throughout—														
Grade A	2,470	2,000	1,870	1,670	1,200	2,000	1,870	1,670	1,200	3,700	3,000	2,800	2,500	1,800
Grade B	3,700	3,000	2,800	2,500	1,800	3,000	2,800	2,500	1,800	5,550	4,500	4,200	3,750	2,700
Grade C	5,550	4,500	4,200	3,750	2,700	4,500	4,200	3,750	2,700	11,100	9,000	8,400	7,500	5,400
Poles in isolated sections of higher grade of construction in lines of a lower grade of construction—														
Grade A	2,470	2,000	1,870	1,670	1,200	1,500	1,400	1,250	900	3,700	3,000	2,800	2,500	1,800
Grade B	3,700	3,000	2,800	2,500	1,800	2,000	1,870	1,670	1,200	5,550	4,500	4,200	3,750	2,700
Grade C	5,550	4,500	4,200	3,750	2,700	3,600	3,360	3,000	2,160	11,100	9,000	8,400	7,500	5,400
Elsewhere than at crossings:														2,160
Grade A	2,960	2,400	2,240	2,000	1,440	2,000	1,870	1,670	1,200	4,440	3,600	3,360	3,000	
Grade B	4,440	3,600	3,360	3,000	2,160	3,000	2,800	2,500	1,800	7,400	6,000	5,600	5,000	3,600
Grade C	7,400	6,000	5,600	5,000	3,600	4,500	4,200	3,750	2,700	11,100	9,000	8,400	7,500	5,400

Allowable Fiber Stresses (in Pounds per Square Inch) for Wood Poles under Vertical and Transverse Loading

Fiber Stresses of Poles Now in Electrical Safety Code

The standard values for ultimate fiber stresses of wood poles (O5a-1930), approved by the American Standards Association as American Standard in December, 1930, and announced in the December, 1930, issue of the ASA BULLETIN, have been incorporated, by virtue of this approval, in the provisions of the National Electrical Safety Code (C2-1927). This is in accordance with Rule 261A4(c) of the Code, which provides that upon their adoption the values of fiber stresses approved by the American Standards Association shall be used. The provision is as follows:

> "Tests are under way to determine ultimate stresses of woods and when values for ultimate stresses have been adopted as standard by the American Engineering Standards Committee (now the American Standards Association), the values thus determined shall be applied under this code and the values in Table 20 adjusted proportionately."

A revision of Table 20 based upon the new values is given above and is to be used in future applications of the National Electrical Safety Code. The standard for ultimate fiber stresses is the first of a series of specifications for wood poles to be completed under the sponsorship of the ASA Telephone Group and approved by the American Standards Association.

Collapse of Grandstands Stresses Importance of Code Work

The necessity for a safety code for grandstands, work on which is under way in an ASA sectional committee, has been very much emphasized during recent months by the collapsing of grandstands in two locations. In Brooklyn, during the basketball season, a grandstand collapsed and threw 1300 people to the floor injuring 250. Fortunately, none were seriously injured. Eight thousand people were in the hall at the time of the crash and, in the confusion which followed, a panic was averted only through the coolness of the ushers and other attaches. In the second instance a stand collapsed, injuring 50 people, during a football game at Donora, Pennsylvania, where 500 high school students were gathered. The stand was new and was being used for the first time.

Due to the fact that there is little or no material available which the committee can use in the development of the safety code, it will welcome any information bearing on the subject which anyone may care to send in.

Symbols for Heat and Thermodynamics Published

The American Tentative Standard Symbols for Heat and Thermodynamics (Z10c-1931), approval of which by ASA was announced in the March, 1931, issue of the ASA BULLETIN, has been published and is available at 30 cents per copy from the ASA office.

ASA PROJECTS

A Review of Chemical, Textile, Wood, and Miscellaneous Projects

The seventh of a series of reviews of standardization projects under the procedure of the American Standards Association

The status of all projects concerning the chemical, textile, and wood industries, and those listed in the miscellaneous project section of the Year Book, which have been developed or are in course of development under ASA procedure, is summarized in the following review. This review is the last in the series of project reviews which started in the November, 1930, issue of the ASA BULLETIN. The data presented are taken from the files of the American Standards Association and are corrected to May 1, 1931. The personnels of the sectional committees handling the projects may be found by reference to the project sections (K, L, O, and X, Z), pages 63–65 and 69–71, of the 1931 American Standards Year Book.

K3-1921—Methods of Chemical Analysis of Manganese Bronze

(*See K4-1921*)

K4-1921—Methods of Chemical Analysis of Gun Metal

The above standards, prepared by the sponsor, the American Society for Testing Materials, were submitted to ASA in 1921 and were approved as American Tentative Standards.

These specifications are now generally accepted and used as the basis for analyses in the larger laboratories of both producers and consumers of manganese bronze and gun metal.

K5-1922—Methods of Chemical Analysis of Alloys of Lead, Tin, Antimony, and Copper

Scope—Methods applying particularly to white metal bearing alloys (known commercially as "Babbitt Metal") and to similar lead-base and tin-base alloys.

The American Society for Testing Materials, as sponsor for this project, submitted specifications prepared by its committee, which were approved by ASA as American Tentative Standard in 1922.

This standard is used as the method of analysis of this class of alloys by commercial analytical chemists as well as by producers and consumers.

K8-1923—Method of Test for Flash Point of Volatile Flammable Liquids

A standard method for determining the flash point of volatile flammable liquids was prepared by the American Society for Testing Materials and submitted for approval by ASA in 1921. The A.S.T.M. acted as sponsor for the project, which was approved as American Tentative Standard in 1923.

These specifications have been adopted by the U. S. Government for determining flash point of petroleum spirits and kerosene and have been widely endorsed by laboratories.

K12-1921—Methods of Battery Assay of Copper

Methods for battery assay of copper were proposed by a subcommittee of the Division of Industrial Chemists and Chemical Engineers of the American Chemical Society in 1915 and were approved by that organization. In the meantime the American Society for Testing Materials undertook the preparation of methods of chemical analysis of non-ferrous metals and alloys that were urgently needed in connection with the Society's standard specifications for these products. The committee having this work in charge turned to the methods of the American Chemical Society which were already in wide use, and cooperation was established between the committees on analysis of the two societies. In 1919 the American Society for Testing Materials decided to publish these methods as tentative and a year later they were adopted as standard by the Society.

Early in 1921 these methods of assay of copper were submitted by the American Society for Testing Materials as an existing standard

and approved by ASA as American Tentative Standard, the A.S.T.M. later being appointed sole sponsor. These methods are widely used and are those generally accepted in the United States for standard analysis in all of the larger laboratories of both producers and consumers of copper and copper products.

K14-1930—Specifications for Liquid Soap

Scope—Specifications covering composition, sampling, and methods of analysis.

Specifications for liquid soap were submitted by the Federal Specifications Board and approved as American Tentative Standard in 1930 under the existing standards method, which permits of approval in cases where it is shown that the standard is supported by a consensus of those substantially concerned with its scope and provisions. In this case, the specifications had been developed by the Federal Specifications Board with the cooperation of the soap section of the American Specialty Manufacturers Association, and had then been submitted to all known American manufacturers of liquid soap, 110 of whom had expressed to the Bureau of Standards their willingness to supply soap guaranteed to comply with the specification requirements. At the time of their approval, the opinion was expressed that questions of concentration, and the addition of a requirement of maximum allowable content of unsaponified oil, might advantageously be included on revision, which it was considered desirable should take place in the near future. A recent canvass of the manufacturers indicated that they do not favor any modification of the specifications at the present time. The soap specified is for toilet purposes, of pure vegetable oil, with or without glycerol or alcohol, suitably perfumed and free from all foreign matter.

K15-1930—Methods of Routine Analysis of White Pigments

(*See K16-1930*)

K16-1930—Methods of Routine Analysis of Dry Red Lead

Standards, submitted by the American Society for Testing Materials as sponsor, were approved as American Standards in 1929.

A revision of project K15 was undertaken by the A.S.T.M. for the purpose of clarifying the method of calculating and expressing the results of the analysis in terms of metallic lead and zinc, lead oxide, and lead sulphate, and was approved by ASA as American Standard in October, 1930. Both of these standards have been largely used by industry as the basis of analysis in their respective fields.

K18-1930—Methods of Laboratory Sampling and Analysis of Coal and Coke

These methods of sampling coal and coke were submitted by the American Society for Testing Materials and approved by ASA in 1929 as an American Standard under the proprietary standards method, the A.S.T.M. being granted proprietary sponsorship for the project. In 1930 the A.S.T.M. submitted minor revisions which were approved by ASA.

These methods were originally prepared by joint committees of the American Society for Testing Materials, the American Chemical Society, and the American Foundrymen's Association, and were adopted by the A.S.T.M. in 1916 and 1918. They were revised by the A.S.T.M. committee on coal and coke during the years 1921 to 1930, the recent revisions consisting of minor changes in some of the methods of test which do not radically change any of the procedures. The methods described in this standard are generally recognized and used as standard by most of the large consumers of coal in the United States, particularly in purchasing coal under specifications for power production. They are also generally used for evaluating coals for gas- and coke-making properties and by large coal producers who process their coal before marketing to improve its quality. The methods for coke analysis are principally used for evaluating coke for metallurgical purposes.

K19—Specifications for Fuel Oils

Scope—The preparation of specifications for fuel oil, including domestic, industrial, and Diesel fuels, and excluding oils with a flash point below approximately 100 F Tag., closed cup, oils burned in wick burners, and oil for gas-making purposes.

Chairman—Lee P. Schneitter, Electric Bond and Share Company, New York, N. Y.

Secretary—A. E. Flowers, The DeLaval Separator Company, Poughkeepsie, N. Y.

The activity of this sectional committee (under the sponsorship of the American Society for Testing Materials) grew out of a request for the standardization of Diesel fuel oils made in May, 1929, by the American Society of Mechanical Engineers. Through a circularization of the request to members of the ASA Standards Council, it was learned that other organizations had a strong interest in several phases of the proposed activity. Among these were the A.S.T.M. which, through the work of

its committee on Petroleum Products and Lubricants (D2), had made noteworthy progress in developing certain specifications and methods of testing such oils, and the Federal Specifications Board which, in cooperation with industry and the Bureau of Standards, had developed specifications for fuel oils. These were later adopted as commercial standards. In view of this general interest and activity in the subject, it appeared desirable to undertake the development of specifications for all the types of oils shown in the above scope when used as fuels. Accordingly, at its meeting on December 18, 1929, the ASA Standards Council sanctioned the proposal and authorized development under the sectional committee method with the A.S.T.M. as sponsor, in accordance with its request for such sponsorship. At the organization of the sectional committee in March, 1930, the work was divided between two subcommittees—one on Domestic and Industrial Fuel Oil with C. C. Ross, chairman, and H. A. Tapp, secretary; and the other on Diesel Fuel Oil, with L. H. Morrison, chairman, and W. H. Butler, secretary.

L3-1931—Specifications for Cotton Rubber-Lined Fire Hose for Public and Private Fire Department Use

Scope—Construction and performance under test, of rubber-lined fire hose for use by private and public fire departments.

Chairman—P. L. Wormeley, Bureau of Standards, Washington, D. C.

Secretary—C. J. Krieger, Underwriters' Laboratories, New York, N. Y.

These specifications were originally submitted to ASA in 1925 under the sponsorship of the American Society for Testing Materials and the Fire Protection Group, and were approved as American Tentative Standard in 1929.

Modernization in methods of rubber manufacture made it advisable to increase the permissible acetone extract provided in this standard from three per cent to four per cent and a revision covering this point was approved in March, 1931, as American Tentative Standard.

L4—Specifications and Standards for Sheets and Sheeting

Autonomous Sectional Committee

Scope—Specifications and standards for sheets and sheeting, including some effective means of presenting data useful to the ultimate consumer in the purchase of sheets, and including such physical characteristics and properties as thread count, weight, breaking strength, loading; other factors which may determine appearance, feel, durability, and resistance to laundering; standardization of sizes and coordination with the simplification work of the division of Simplified Practice in this field; a system of grades for sheets; and methods of inspection and test.

A general conference on the subject of specifications and standards for sheets and sheeting was held under the auspices of ASA in May, 1928, and was attended by 54 representatives of 36 organizations. The Textile Division of the Bureau of Standards, and the Textile Section of the American Home Economics Association, and other organizations had already made studies of several phases of standardization of textiles, as a result of which the American Home Economics Association made a formal request to the American Standards Association for the initiation of a project dealing specifically with sheets and sheeting.

The conference unanimously recommended that ASA proceed with the work. Arrangements were made for the preparation of definite proposals as to the best methods of undertaking the development of standards and the compiling of a review of what work had already been accomplished in this field. Early in 1929 the organization of a representative technical committee, responsible for the formulation of the specifications and standards, was completed, and the committee was formally approved by ASA. It consists of 32 representatives of 23 organizations. The scope was approved at the same time.

Following the organization meeting of the technical committee, several meetings of a smaller working committee were held, and a draft standard was prepared which included maximum weights for light, medium, and heavy weight sheets and sheeting; the maximum amount of finishing materials to be allowed, and methods of testing their presence; also the provision that this information should be specified on a label which should further show tensile strength of warp and filling, tolerance limits, and thread count. This draft was prepared with the active cooperation of the Cotton Textile Institute, and the Institute was then requested to secure careful consideration of the draft by its members. It is indicated on behalf of the Institute that its members are not favorable to making this information available to the consumer as a basis for the purchasing of sheets. On the other hand, it has been indicated informally that the members of the Institute are not now prepared to take the public responsibility for the abandonment of the project, and that further efforts should be made to seek some satisfactory solution.

L5-1931—General Methods of Testing Woven Textile Fabrics

Scope—General methods of testing woven textile fabrics, exclusive of materials requiring special treat-

ment (for which specific methods of test will be described applicable for that material and such special methods shall take precedence over the general methods) and exclusive of cord fabrics used in manufacturing tires.

Standard methods of test for cotton yarns and fabrics, submitted by the American Society for Testing Materials, were formally approved as American Tentative Standard in 1923. In the ensuing years it became evident to the groups working on various phases of the subject that their methods were generally applicable to all kinds of textile fabrics. A standard was drafted, therefore, embracing generally recognized methods of testing for practically all types of textile materials from airplane fabrics to dress materials and household linens (exclusive of cord fabrics used in manufacturing tires), and was formally approved as American Standard in 1931.

Test methods are provided to determine length, width, weight, number of threads per inch, thickness, tensile strength, and crimp. Strip and grab tests are used in determining tensile strength. The former consists in straining to the point of rupture a strip of fabric clamped at either end into the jaws of a testing machine; in the latter test, jaws of a given width are made to reach into the body of a rectangular piece of fabric and strain it till it tears.

L6—Specifications for Blankets

Scope—Standardization of sizes, and tolerances thereon, for all-wool, part-wool, and cotton blankets (having due consideration for the work of the Department of Commerce); minimum limits for tensile strength; a system of standard weights; and physical and thermal properties, as a basis for performance specifications.

The fact that blankets are frequently sold under conditions with respect to representation of their wool content, etc., resulting in misleading inferences on the part of the purchasing public, was one of the reasons advanced by the American Home Economics Association in requesting that fabric and performance specifications for bed blankets be developed by the ASA. A preliminary conference of representatives of thirteen interested organizations unanimously voted in favor of the organization of a technical committee for the purpose of making studies leading to the establishment of specifications. A small steering committee was authorized, and three technical subcommittees were set up to prepare tentative recommendations on (1) sizes and tolerances of blankets, (2) tensile strength, and (3) weight. The proposed scope of the project is as follows:

Recommendations of the Wool Blanket Manufacturers Association have been requested in regard to tensile strength requirements for all-wool and part-wool blankets. The Association has not yet taken action in the matter. It is proposed that a campaign of education be conducted in the retail blanket trade as a further step. The matter is complicated by actions pending before the Federal Trade Commission in regard to whether it is an unfair trade practice to designate blankets as "part-wool," when they contain only a very small percentage of wool.

O3-1926—Specifications for Cross-Ties and Switch-Ties

Scope—The unification of specifications for wood cross-ties and switch-ties for all classes of use, including mine ties; grouping with regard to preservative treatment, but not including methods of treatment and unification of inspection rules.

Chairman—John Foley, Forester, Pennsylvania System, Philadelphia, Pa.

Secretary—Arthur T. Upson, Consulting Engineer, National Lumber Manufacturers Association, Transportation Building, Washington, D. C.

In 1921, requests were received by ASA from the Forest Service of the U. S. Department of Agriculture and the American Railway Engineering Association for a conference of interested bodies to determine the desirability of undertaking standardization of specifications for railway cross-ties and switch-ties. The interest of the Forest Service was from the standpoint of conservation as well as of standardization of forest products. A conference was held in October of that year, as a result of which it was decided that work on this project should be undertaken under the joint sponsorship of the U. S. Forest Service and the American Railway Engineering Association. A sectional committee was organized in 1922 and after prolonged consideration of the draft specifications which were drawn up from time to time the final specifications were submitted to ASA and approved as American Standard in 1926. These specifications have since been adopted as standard practice by the National Hardwood Association and the Manufacturers Standardization Committee of the National Lumber Manufacturers Association. The Committee on Ties of the Engineering Division, American Railway Association, has expressed the belief that this standard represents the best current practice and that inspection of the ties in accordance with these specifications, which are acceptable to the producers of ties, will bring about distinct improvement in the industry.

O4—Methods of Testing Wood

Scope—Methods of physical, including mechanical, testing of wood as a material in structural form, or as standard specimens, but not including methods of testing articles manufactured from wood.

Chairman—L. J. Markwardt, Section of Timber Mechanics, Forest Products Laboratory, Madison, Wis.

Secretary—M. O. Withey, Professor of Mechanics, University of Wisconsin, Madison, Wis.

A joint request was received in 1921 from the U. S. Forest Service and the American Society for Testing Materials that work be undertaken under ASA procedure for the development of standard methods of testing wood, and a sectional committee was duly organized in 1922 under the joint sponsorship of the A.S.T.M. and the Forest Service. The development of this sectional committee was the outgrowth of a desire on the part of the sponsors to have the joint work in standardizing methods of testing wood proceed on a broad national scale and secure the widest possible recognition.

It was decided to use as a basis for the work on this project the tentative standards then being developed by the A.S.T.M., and two subcommittees were appointed—one on methods of test for small clear specimens, C. E. Paul, chairman, and one on methods of test for structural sizes, M. O. Withey, chairman. The development of the two test procedures offered for the consideration of the sectional committee had as a background the extensive timber testing work carried out in the United States over a period of many years, as well as that of other countries.

During 1923 the two proposed tentative methods were submitted for comment and criticism to some 60 universities and other institutions interested in the testing of wood.

From time to time changes were made in these test procedures as a result of comments received and it was felt that sufficient time should be allowed for these methods to prove themselves in practice. It was, therefore, not until 1927 that Methods of Testing Small Clear Specimens of Timber (O4a-1927) and Methods for Conducting Static Tests of Timber in Structural Sizes (O4b-1927) were submitted to ASA and approved as American Standards. The methods given in the standard represent the entire procedure from selection of the trees to the manipulation of the test, thus controlling factors, such as the size and proportion of test specimens and rate of loading, which may influence results. Application of the standard will enable one more readily and surely to select the one wood which is best suited for any specific purpose.

O5—Specifications for Wood Poles

Scope—Standardization of dimensional classifications, defect descriptions and limitations, manufacturing practices and inspection rules for eastern cedar, western cedar, chestnut, and southern pine poles, lodgepole pine and Douglas fir poles; also standardization of fiber strengths for these species in pole sizes.

Chairman—R. L. Jones, Director of Apparatus Development, Bell Telephone Laboratories, New York, N. Y.

Vice Chairman—R. H. Colley, Bell Telephone Laboratories, New York, N. Y.

Secretary—A. B. Campbell, National Electric Light Association, New York, N. Y.

In June, 1922, an association interested in wood poles from the consumer's standpoint submitted to ASA for adoption as an American Standard its specifications for wood poles. Objections to these specifications were raised on the ground that they did not embody the points of view of all interested in the subject.

A special committee was appointed to review the specifications and the objections which had been raised. In March, 1923, this special committee disapproved of the specifications submitted and recommended the formation of a sectional committee on wood poles to prepare specifications consistent with modern conditions. After further discussion, the committee recommended that the sectional committee work go forward under the leadership of the Telephone Group, consisting of the Bell Telephone System and the U. S. Independent Telephone Association.

The committee decided to proceed with its work through the medium of subcommittees. These were instructed to draft specifications for western red cedar, eastern cedar, chestnut, and southern pine poles, and to formulate standard fiber strengths and definitions.

Late in 1927 a new chairman was elected by the committee and an executive committee was organized consisting of the officers of the sectional committee and the chairmen of the various subcommittees.

The subcommittee on fiber strengths at a meeting held in November, 1929, unanimously approved a set of values for fiber strengths for the four species of woods under consideration. Approval by the entire sectional committee and the sponsors followed and on November 29, 1930, they were approved as American Standards by ASA.

In January of the following year a new subcommittee to formulate uniform dimension tables was appointed, this phase of the work having been covered by the subcommittees in charge of specifications. Rapid progress was made on the subject of pole dimensions and the final report was presented to the sectional committee in May, 1929, being held in that committee until the completion of the work on specifications.

The work of preparation of the specifications by the species committees was much hampered by the fact that no agreement could be reached on the question of knot limitations, and it was necessary for a special committee to make

a study of the data obtained from poles in yards in various locations in order to reach an agreement upon this subject. Such an agreement was finally reached and embodied in the draft specifications.

Further work was necessary to smooth out minor difficulties in the specifications and in January, 1931, a meeting of the sectional committee was held at which final reports from all of the subcommittees covering specifications for the four species of wood originally considered were presented, together with the final report of the committee on uniform dimensions. It was also decided to enlarge the scope of the work to include specifications for lodgepole pine and Douglas fir poles. A letter ballot of the sectional committee is being taken, and it is expected that these specifications and uniform dimension tables will be submitted to ASA for approval in the near future.

X1-1921—Method for Sampling of Coal

This method for sampling of coal was submitted by the American Society for Testing Materials as an existing standard and was approved by ASA as an American Tentative Standard in 1921, the A.S.T.M. later being appointed sole sponsor for the work. The method indicated in this standard applies principally to the testing of large samples of coal, that is, carload or shipload quantities, and should not be confused with the method employed in the laboratory sampling and analysis of coal which is covered by the American Standard K18-1930.

In the preparation of this standard method the Bureau of Mines took an active part and has brought the method into general use in its own work and recommended it for use wherever coal deliveries are sampled. The Bureau has found that the specifications meet the need of the industry.

Z7-1925—Illuminating Engineering Nomenclature and Photometric Standards

Scope—The definition of terms used in illuminating engineering and photometry, together with the formulation of general principles to govern the measurement of light and illumination and the application of such measurements in practice.

This standard was submitted by the Illuminating Engineering Society to ASA and approved in 1925 as an American Standard, the Society being appointed sole sponsor. In 1928 the sponsor announced its intention to revise the standard, requesting that the standard when revised be considered as its proprietary standard. This request was granted by ASA. The proposed standard in revised form was published for criticism and comment in the *Transactions of the Illuminating Engineering Society* of October 8, 1930. Its submission to ASA for approval may be expected in the very near future.

Z10—Scientific and Engineering Symbols and Abbreviations

Scope—A broad program of unification of graphical symbols, and symbols for quantities in equations and formulas, and of abbreviations, as used in engineering and scientific reports, tables, publications, etc.; but not including definitions of terms used in engineering and scientific practice.

Chairman—J. F. Meyer, Bureau of Standards, Washington, D. C.

Secretary—Preston S. Millar, Electrical Testing Laboratories, New York, N. Y.

The great confusion existing in text-books and technical journals of the various industries and professions because of the wide variation in the symbols and abbreviations used has long been a source of misunderstanding and continued discussion among scientific and engineering groups throughout the English-speaking world. The unification of these symbols and abbreviations was particularly desired by research workers, designing engineers, and many others in order that the formulas which were widely used might be readily understood and applied more quickly and with fewer errors. A formal request for the unification of such practices was made of the American Standards Association in 1922 by the American Institute of Electrical Engineers and the Association of Edison Illuminating Companies. The need for undertaking the proposed activity was further endorsed at a conference of various interested groups. Five leading technical societies, after a long delay in considering the responsibilities and interrelations of the organizations eligible to assume sponsorship, accepted joint sponsorship for the sectional committee which they organized in January, 1926.

The ramifications of the scope of the activity made it desirable to subdivide the work among several groups on the following topics: symbols for mechanics, structural engineering and testing materials; hydraulics; heat and thermodynamics; photometry and illumination; aeronautical engineering; mathematics; electrotechnical symbols, including radio, navigation, and topography; and abbreviations for engineering and scientific terms.

Development of these projects proceeds slowly because of the magnitude of the work, but satisfactory progress was made and the following reports have been adopted as American Standard or American Tentative Standard:

Symbols for Hydraulics

Photometry and Illumination

Aeronautics

Mathematics

Navigation and Topography

Letter Symbols for Electrical Quantities

Graphical Symbols for Telephone and Telegraph Use

Symbols for Heat and Thermodynamics

Proposed standard graphical symbols for use in radio communication are now before the American Standards Association for approval and designation as an American Tentative Standard. An objection was raised to these proposed symbols by a large electrical manufacturer who stated that they wished to see the radio symbols made uniform with those for electric power and wiring which are reaching final form, their reason being that radio devices are now being used in connection with the control of large power machinery and for that reason two symbols for the same device should not be adopted. The Standards Council referred the proposal back to the sectional committee for further consideration.

Z11—Methods of Testing Petroleum Products and Lubricants

Scope—Methods of test of petroleum and all products derived therefrom, except tests applied to such products used as road or paving materials or for waterproofing; methods of test of lubricants, including all materials used for lubrication when they consist either wholly or in part of petroleum products. The scope of this project excludes tests applied to organic chemicals or to products used medicinally.

Chairman—F. A. Hull, General Electric Company, Schenectady, N. Y.

Secretary—R. P. Anderson, American Petroleum Institute, New York, N. Y.

In October, 1922, the American Society for Testing Materials called attention to the need for nationally recognized standard methods for testing petroleum products and lubricants and requested that the project be formally undertaken under the procedure of the American Standards Association. In the request it was pointed out that since 1904 the A.S.T.M., through its Committee on Standard Tests for Lubricants, had been engaged in this field. This committee had during these years labored in what was then an entirely undeveloped field, conducting numerous investigations, and had finally developed certain widely accepted tests for various properties of lubricants. In 1920, the scope of the A.S.T.M. Committee on Petroleum Products and Lubricants (D-2) was extended to include the broad field of developing standard methods of testing petroleum products and lubricants and the committee personnel was considerably enlarged. A special investigating committee appointed by ASA found that industry favored undertaking the proposed activity. On March 8, 1923, the ASA Standards Council approved the request and invited the A.S.T.M. to accept sponsorship for the work. The development of a scope of activity and personnel of the sectional committee extended over a considerable period of time and it was not until February, 1927, that the personnel was formally approved. However, through the continued activity of the A.S.T.M. Committee on Petroleum Products and Lubricants, a number of standard methods of tests had been developed. Some of these were referred to the sectional committee for review with the result that 23 methods of test have been submitted and approved as American Standard or American Tentative Standard during the past three years. Nine of those previously approved by ASA have been revised. During 1930, these revisions were reapproved in the same status as previously held with the exception of the Method of Test for Detection of Free Sulfur and Corrosive Sulfur Compounds in Gasoline (Z11u) which was advanced to the status of an American Standard.

Z14—Standards for Drawing and Drafting Room Practice (Exclusive of Architectural Drawings)

Scope—Classification of and corresponding nomenclature for drawings in accordance with their purpose, method of representation of the subject, including arrangement of views and sections, use of lines of different kinds and thickness, indication of dimensions, tolerances, and fits, tapers and slopes, and surface or finish, symbols for elements, indication of materials by cross-hatching, arrangement of borderline, title, part list, notes, changes, and revisions, method of folding and punching, kinds and sizes of lettering, figures, and symbols, scales of reduction and enlargement, sizes of drawings and filing cabinets, width of rolls of paper and cloth, size of drafting equipment and tools, specifications of materials to be used for drawings and drafting, exclusive of architectural drawings.

Chairman—Franklin DeR. Furman, Stevens Institute of Technology, Hoboken, N. J.

Secretary—Carl W. Keuffel, Hoboken, N. J.

In 1925 the American Society of Mechanical Engineers requested ASA to consider the undertaking of work on the above subject by a sectional committee. A general conference led to the organization of such a committee, the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education being appointed joint sponsors. Subcommittees were formed to deal with several subjects and so far those on methods of indicat-

ing dimensions, lettering, layout of drawings, and line work have published draft standards for criticism and comment. Other subcommittees are working on specifications for paper and cloth, and on graphical symbols on drawings. An Editing Committee has also been appointed.

Z15—Standards for Graphic Presentation

Scope—Includes standard methods for the graphic presentation of business and other data.

Chairman—E. F. DuBrul, National Machine Tool Builders Association, Cincinnati, Ohio.

Secretary—George E. Hagemann, Alexander Hamilton Institute, New York, N. Y.

In 1925 the American Society of Mechanical Engineers requested ASA to authorize the organization of a sectional committee on standards for graphics. A special committee appointed by ASA recommended that the work be taken up and include standard methods for the graphic presentation of business and other data. It was further recommended that the basic principles underlying such graphics be standardized, and that no attempt be made to give detailed specifications for particular cases, and that the work of the sectional committee be coordinated with that on Drawings and Drafting Room Practice (Z14) and Scientific and Engineering Symbols and Abbreviations (Z10). The A.S.M.E. was appointed sole sponsor and in 1926 organized a sectional committee. Subcommittees were formed as follows: (1) Plan and Scope; (2) Terminology; (3) Time Series Charts; (4) Non-Time Series Charts; (5) Survey of Current Practice; and (6) Engineering and Scientific Graphs. A proposal on definitions for statistical terminology was developed by subcommittee 2 and published for criticism and comment in 1928. In 1931 the work of subcommittees 3, 4, and 5 was merged into a single subcommittee on Preferred Practice in Graphic Presentation.

Z17-1927—Table of Preferred Numbers

Scope—Development of a system of numbers in geometric series for use in size standardization.

In 1922 the American Standards Association recognized the practical value of the preferred numbers technique and, cooperating with the American Society of Mechanical Engineers in an extensive public discussion of the subject, called the attention of industry to the possibilities which lay in the adoption of such a system as a general basis for engineering design. Interest being shown with respect to many aspects of the question, ASA in 1923 appointed a technical committee which, after a careful study of the problem, decided to recommend the tentative adoption of a system of preferred numbers following closely the German standard. In 1927 ASA informally approved this system of preferred numbers, recommending it to American industry for a period of trial in practice. Recently ASA decided that the subject should be given renewed consideration by an autonomous sectional committee whose organization will take place in the near future. The new committee will review the recommendation of 1927, together with any data which have become available since.

Z18—Standardization of Speeds of Machinery

Scope—Standardization of the speeds of machinery and of such elements for mechanical power transmission as are functions of said speeds.

Chairman—Allan E. Hall, Allis Chalmers Manufacturing Company, Milwaukee, Wis.

Secretary—W. S. Hays, Executive Secretary, Power Transmission Society, Philadelphia, Pa.

In 1927 the National Electrical Manufacturers' Association requested ASA to have standardization of speeds of driven machinery undertaken under its auspices. A general conference called by ASA resulted in the recommendation that the project be undertaken and that the American Society of Mechanical Engineers be appointed sole sponsor. Discussion of the subject brought out that speeds of driven machinery could not well be standardized without consideration also being given to the speeds of driving machines, more particularly the speeds of electric motors. Accordingly, the scope of the work was expanded to cover the speeds of both driving and driven machinery. A sectional committee was organized and a series of definitions of machine speeds was tentatively established and used as a basis for a questionnaire on industrial practice recently sent out by the sectional committee. Further details about the history and development of the work on this project may be found on page 31.

Z21—Approval and Installation Requirements for Domestic Gas Burning Appliances

Scope—Establishment of minimum or basic requirements for performance, safe operation, and substantial and durable construction for domestic gas burning appliances; together with laboratory methods of test for determining compliance therewith.

A Gas Safety Code was prepared by a joint technical committee representing all interested groups under the leadership of the American

Gas Association and the U. S. Bureau of Standards and formally approved as American Standard in 1927 (Z21). At that time it was understood that this document, covering fundamental principles, should be followed by a group of supplementary standard specifications complying with the code but going into detail. Work on such a group has been going on within the American Gas Association covering: gas ranges; gas fixtures; flexible gas tubing; testing and rating of invented gas-fired steam radiators; testing and rating of gas-fired steam boilers; circulating water heater cocks; and industrial gas series on bakeries, hotels, and restaurants; on house heating; and on combustion; and manuals on gas piping in buildings; installation of gas appliances; gas appliance design; water heaters; and room heaters.

Some months ago, the A.G.A. requested formal recognition of its approval requirements committee as a technical committee of ASA, and broadened its committee by adding to it officially appointed representatives of various other interested groups, such as the American Home Economics Association, American Institute of Architects, National Safety Council, and Underwriters' Laboratories. Approval by ASA of the personnel of the technical committee, and the scope, followed in September, 1930. The technical committee has before it the question of determining which of the standard specifications already developed are in such shape as to warrant their submittal as American Standards, and which need further revision and development before such submittal.

Z22-1930—Dimensional Standards and Recommended Practice for Motion Picture Apparatus.

The Society of Motion Picture Engineers in 1930 submitted to ASA for approval as American Standard a new edition of the dimensional standards for motion picture apparatus and recommended operating practices, at the same time requesting that the form of sponsorship be changed to the proprietary method. These standards were first approved as existing standards in 1928 under the designations Z6a-1928 and Z6b-1928, the S.M.P.E. being approved as sole sponsor. In addition to the specifications covered by these two standards the new edition included films of smaller widths (16 mm) as used in amateur apparatus and sound-on-film practice, both of which were in practically universal use in this country. A canvass was made of the outstanding associations in the industry to ascertain their opinions as to the acceptability of the proposed standards to the motion picture industry as a whole. The replies seemed to indicate that the groups interested found these standards acceptable and they were accordingly approved by the Standards Council of ASA as American Standard. Since that time, however, there has been some discussion as to the advisability of changing the recommended practice covering the ratio of height to width of film and it is possible that a further revision of these standards will take place in the near future.

Variable Speed Motors for Abrasive Wheels

An inquiry has been received by the American Standards Association concerning the advisability of using variable speed motors for abrasive wheels so that the speed of the wheel can be increased as the wheel wears down, thereby keeping up the peripheral velocity to what is considered best practice for grinding.

Although this question did not come up for consideration by the ASA Sectional Committee for the Use, Care, and Protection of Abrasive Wheels (B7-1930), it is presented here as an item of interest to users of this type of equipment.

An investigation of the matter by the ASA staff has shown that, where the practice of using variable speed motors has been followed, some grinding wheels have gone to pieces. In these cases, in order to avoid a recurrence of such accidents, the rheostats have been locked up and the key kept in the possession of the foreman of the department. The investigation indicates that there is no general objection to the use of variable speed motors in the way suggested by the inquiry but provision should be made for linking the control with the diameter of the wheel so that the wheel will be automatically protected from bursting due to excessive speed. It is understood that in some cases a centrifugal speed control has been used to keep the wheel within a safe speed.

Another scheme that has been tried out with some satisfaction is to shift the wheel from one grinder to another as it wears, care being taken that the wheel and grinder are so arranged that a wheel of large diameter cannot be placed on the shaft of a machine which has the high speed.

The American Standards Association will be glad to receive technical inquiries of this type affecting any of its projects. The investigation in connection with such inquiries will not only enable ASA to be of service to the one making the inquiry but will raise questions which will be of value to the sectional committees in charge of the projects in their endeavor to keep the projects abreast of the times and in line with the latest technical information.

Standardization of Clean Coal Is Requested

The American Institute of Mining and Metallurgical Engineers have requested that a project looking to the establishment of "standards for clean bituminous coal" be instituted under the procedure of ASA. Although such a standard would appear to be a departure in national standardization activities, it is actually similar in its aims to standards for metal and other products which specify maximum percentages of impurities.

Mr. Howard N. Eavenson, chairman of the Coal Division of the Institute of Mining Engineers, has written as follows in regard to the desirability of setting up such standards:

> "For some time discussion has been going on in the bituminous coal business about the meaning of 'clean' coal. Most coal mined and shipped has had no preparation other than casual inspection and separation of the larger impurities in the mine by the loader; a large percentage, in addition to this, has the coal screened at the tipple and certain parts of it spread on picking tables and cleaned by hand; a smaller, but rapidly increasing percentage, is being cleaned by mechanical processes, either wet or dry, this treatment usually being of the sizes not cleaned by hand, although sometimes all of it is mechanically cleaned.
>
> "When coal thus treated is sold it is all sold as 'clean' coal, while in some sizes of some coals there may be 0.5 per cent of pieces of impurities, while others may contain 4 per cent. The smaller amount may be the absolute minimum which it is possible to reach, while the larger one depends upon the methods and management used. The amounts of impurities necessarily present will vary with the sizes of coal, being usually greater in the smaller sizes.
>
> "It is obvious that the mine shipping 'clean' coal on the minimum impurity basis is handicapped in competing with one shipping a larger amount, although both products may have been cleaned. In these days of price competition all of these items count, and an agreed-upon basis will be of help not only to the shipper, but also to the consumer, who will then for the first time know what he may expect when he buys 'clean' coal and will have a standard by which he can measure it."

The question of the initiation of this work will be submitted to the Standards Council at an early date and, if approved by the Council, work will be undertaken by a technical committee.

New Member Appointed on Safety Committees

The National Bureau of Casualty and Surety Underwriters has announced the appointment of W. M. Graff as Director of its Safety Engineering Division.

Mr. Graff is planning to take an active part in the development of national safety codes. He is representing the National Bureau of Casualty and Surety Underwriters as full member of the committee for Standardization of Methods of Recording and Compiling Accident Statistics (Z16) and as alternate representative on several other sectional committees. In this way he will be in close touch with most of the safety codes being developed. Mr. Graff will also serve as an alternate representative of the National Bureau of Casualty and Surety Underwriters on the Standards Council, the Safety Code Correlating Committee, and the Mining Standardization Correlating Committee of the American Standards Association.

Paper on Standardization Is Available

The American Standards Association has received copies of a paper on standardization by C. E. Skinner, Assistant Director of Engineering, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The paper was read by Mr. Skinner before the World Engineering Congress in Tokio in 1929, where he was ASA representative. It includes a history of standardization, a classification of standards and standardizing agencies, and a statement of the work being done in the field of safety standards, traffic control standards, and in the organization of national standardizing bodies.

A limited number of copies of Mr. Skinner's paper are available and the American Standards Association will be glad to send a copy to anyone interested.

Standard Specifications for Fire Hose Published

The American Tentative Standard, Specifications for Cotton Rubber-Lined Fire Hose for Public and Private Fire Department Use (L3-1931), has been published and copies may be purchased from the ASA office at 25 cents per copy. Announcement of the approval of the standard was published on page 30 of the April issue of the ASA BULLETIN.

Committee on Standardization of Speeds of Machinery Circulates Questionnaire

A survey to determine present practice in various plants and industries with respect to the speeds of driving and driven machinery is being made by means of a questionnaire by the ASA sectional committee on speeds of machinery (Z18). A sectional committee to deal with the standardization of the speeds of machinery and of such elements for mechanical power transmission as are functions of these speeds was organized under ASA procedure in 1928. The purpose of its work will appear more clearly in the following proposed program of work which was tentatively adopted at the organization meeting. It comprises the establishment of:

1. a series of standard speeds of transmission shafting and driven machines, to be based on a standard series of speeds of driving machines (particularly electric motors)

2. a series of standard diameters of pulleys and of the pitch circles of gears and chain sprockets, resulting in a series of standard transmission ratios

3. a series of standard widths of pulleys and of belts of different kinds, and a standard pull per inch of width for belts of each kind

4. a standard series of belt speeds

5. tables of:

(*a*) the power to be transmitted by the maximum permissible torque in shafts of the different standard diameters at different standard shaft speeds

NOTE—Such tables would be useful in giving the immediate, though approximate, diameter of shafting needed for the transmission of a given power and should be based on a definite kind of shafting material. In determining the diameter of the shaft actually required the influence of flexure must be taken into account by the designer (see the Tentative American Standard B17c-1927: Code for Design of Transmission Shafting). Tables are not suitable to take care of this as conditions of load and support of a shaft vary greatly in individual cases.

(*b*) the power to be transmitted per inch of belt width, by belts of a definite kind of material and construction, for different standard shaft speeds and different standard pulley diameters

6. a standard series of diameters and width of sheaves for transmission ropes and of pulleys for steel transmission bands

In order to develop this work the committee found that it would be necessary to establish a set of definitions of machine speeds. Such definitions were worked out and tentatively approved as follows:

the machine speed of

a built-in drive is the speed of the shaft on which the rotating element of the driving unit is mounted

a geared drive is the speed of the driving pinion

a coupled drive is the speed of the initial shaft to which the driving unit is coupled

a cone pulley belt drive is the speed of the countershaft

a single pulley belt drive is the speed of the driven pulley

a V belt drive is the speed of the driven sheave

a rope drive is the speed of the driven sheave

a chain drive is the speed of the driven sprocket

a friction drive is the speed of the driven member

These definitions have served as the basis for the questionnaire which was recently sent out to industry. This questionnaire is accompanied by a table listing a proposed series of standard speeds which is submitted to those receiving the questionnaire for criticism and comment as to whether the speeds in question would cover their needs in a satisfactory manner. The table is shown on the next page.

In addition to the question as to whether the definitions of different machinery speeds mentioned above appear to be satisfactory, the following questions are submitted to those convassed:

Can the proposed series of speeds be used for future design of equipment without undue difficulty?

What speeds of driving and driven shafts are you (*a*) using in your plant, and (*b*) providing for in the machines which you manufacture? Please state type of machines in each case.

What series of speeds of driven machinery and/or transmission equipment do you suggest be made American Standard to cover (*a*) the requirements of the machines you use in your plant and (*b*) the machines which you manufacture?

What kinds of product do you manufacture?

36	300	1200	10,620
56	400	1800	15,720
90	600	2400	23,400
133	720	3600	34,500
200	900	7200	51,000

TABLE 2

Proposed Series of Standard Speeds (in Revolutions per Minute) for Driving Units and Driven Shafts of Machines According to Definitions

Any organization that wishes to contribute to the work of the sectional committee by submitting its reply to the several questions listed in the questionnaire is invited to do so by addressing its reply to F. S. English, chairman, subcommittee 2 on Questionnaire and Canvass of Industry, care of the American Society of Mechanical Engineers, 29 West 39 Street, New York. The A.S.M.E. has been appointed sole sponsor for the work on speeds of machinery.

Preferred Numbers Are Used in Wood Pole Standard

The general applicability of a system of preferred numbers is emphasized by a recent statement by R. L. Jones, Director of Apparatus Development of the Bell Telephone Laboratories, who is chairman of the ASA sectional committee on wood poles (O5). In commenting on the preferred numbers article by R. E. Hellmund which appeared in the January issue of the ASA BULLETIN and on the relationship of preferred numbers to the work on the wood poles standard, Mr. Jones said:

"Our problem was not one of establishing sizes for articles to be manufactured, but rather to take a continuous range of sizes as they grow and to select certain minimum limits to bound successive subdivisions. The limits selected approximate the '10 series' and we have the same number of classes that we would have had with an exact '10 series' scheme, so that, as far as economic use is concerned, we have followed the preferred number principle of dividing the total range into the smallest practicable number. What we did was to use an approximate 25 per cent interval for the moments of resistance of poles corresponding to the subdivisions of the majority of the classes and then cut down the interval for the first two classes to meet special demands of pole-using interests who could not otherwise have been brought into harmony with the group as a whole."

Building Officials Conference Votes on Refrigeration Code

Compliance with the provisions of the ASA Safety Code for Mechanical Refrigeration (B9-1930) has been recommended for inclusion as a provision of the Building Code of the Pacific Coast Building Officials Conference. This provision is one of 123 revisions being voted upon by the members of the Conference. The approval of this recommendation will assure the adoption of the Safety Code for Mechanical Refrigeration in numerous California municipalities, as well as in cities of other states where the recommendations of the Pacific Coast Building Officials Conference are enacted into the local building regulations.

The extent of the influence of the Conference is evident in the fact that a total of 92 cities have adopted the Uniform Building Code. Sixty-nine of these cities are located in California, 23 are in the other Pacific Coast states, two are in Utah, and two in Idaho.

New Member on Preferred Numbers Sectional Committee

R. E. Hellmund, Chief Electrical Engineer, Westinghouse Electric and Manufacturing Company, whose article on the preferred numbers system was published in the January issue of the ASA BULLETIN, has been appointed to represent the American Institute of Electrical Engineers on the special committee on preferred numbers (Z17-1927) to succeed C. F. Hirshfeld, Detroit Edison Company. This special committee developed the table of preferred numbers informally approved by the American Standards Association in 1927.

STANDARDIZATION WITHIN THE COMPANY

The Development of Standardization Work in Czechoslovakia's Largest Plant

by

F. J. Schlink

Economies and improvements in production achieved through the general introduction of the use of standards and specifications in the Skoda Works

The most important plant in Czechoslovakia is that known as the Skoda Works, organized about 60 years ago. It manufactures a wide variety of products, including railway and shipbuilding material, gears, springs, forgings, and the like, locomotives, engines, and machinery in great variety, automobiles, tractors, electric central station equipment and machinery, road-making machinery, precision tools, and the complete equipment for various industrial plants such as sugar factories, alcohol distilleries, refrigerating plants, slaughter houses, rolling mills, gas works, and mining equipment. The Skoda Works have published a large illustrated book of more than 150 pages describing their activities and products. Standardization and research are given special treatment in this book. Standardization is defined as

> "the introduction of order, regularity and unified treatment in any process which involves repetition.
>
> "In order to be able to carry out systematic standardization, special aids are necessary, such as statistics, experience, tests of earlier years, and consultation of all technical experts and persons taking part in the processes under consideration."

As in all large plants, different departments of Skoda Works carried out some of the operations by widely different methods, resulting in a mass of drawings and patterns all intended to fulfill the same purpose. From such practices it resulted that storerooms were filled with tools and machine parts of varying designs either used very little or no longer used at all. All of this made great difficulties in the scheduling and issuance of stores, adding to the administrative burden in the factory.

The first step was to simplify the accessories required for machine tools: tapers, dowels, bushings, and the like. Variety in these, which had been necessitated by the different makes of the tools, involved serious losses in time in the machining of individual parts, because of the necessity of searching for the needed part or specially preparing the machine in question for its use. Jigs, tools, tool-holders, and the like were similarly standardized, in the same way as tapers for lathes, and for drilling and milling machines. The standardization not only assured a consistent plan for the rearrangement and refitting of existing equipment, but also gave underlying principles for the construction and purchase of new tools and machines.

Standardization of diameters had an important reaction on the other problems, tending to simplify the considerations involved in the standardization of tools in general, as well as greatly reducing the number required. All of this had its effect upon working drawings, and with the planning of mass production and centralization of manufacture of the necessary tools and parts in one department, it became necessary to provide for the design of tools in a special tool engineering department which was in a position to study fundamental questions in the working of metals, and to carry out the standardization of further, more advanced tools.

The old system of haphazard production and fitting together of two elements which had to work together, depending largely upon the individual judgment of the workman or foreman, involved great wastes of time and material. Accordingly, a system of limit gages was adopted permitting parts to be finished independently of each other, while at the same time their interchangeability at the end of the several operations could be relied upon.

This, like the centralized design and production of tools, brought about changes in the organization and administration of the shop, and raised new problems which had to be met in turn. The designing office not only had to

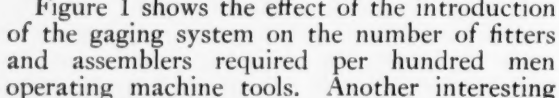
provide for training the workmen in the new methods and to decide by conference with them

FIG. 1

Effect of Introduction of Gaging System on the Relation of Hand-Workers to Machine Workers

and others upon the proper tolerances, but had to provide in the working drawings for the method of using tolerances, this necessitating a great deal of revision of existing drawings and the preparation of many new ones. One of the major results of this revision was that separate drawings were made for each separate part. This standardization naturally led to standardization in the methods of making the drawings themselves, including their size, lettering, nomenclature adopted in notes, and the like.

Figure 1 shows the effect of the introduction of the gaging system on the number of fitters and assemblers required per hundred men operating machine tools. Another interesting index of the effect of the gaging system is that shown by a study of the number of hand files used for final fitting in the different shops.



Skoda Works at Plzen

Figure 2 shows the sharp decline in the number of files per year per workman, with the introduction of standard methods and tolerances. The German system of fits between cylindrical parts was at first introduced, but in some respects was found wanting, in the judgment of Skoda engineers, in certain practical requirements of production. For this reason a somewhat revised system was developed in Czechoslovakia and used in the Skoda Works. Incidentally, objections raised against the German system have been entirely straightened out by international discussion of the matter under the auspices of the International Standards Association (ISA), and an international proposal for a unified system of fits has been approved, both by the German and the Czech delegates on the committee.

The question of materials early came into consideration, since new designs and differences in mechanical requirements called for materials of corresponding qualities. Steels were first standardized (carbon, alloy, and cast), and then gun metals, and brazing and soldering metals and mixtures. Next, definite instructions for the *use* of different materials were issued for the guidance of the drafting room and shop. Rolled shapes and drawn sections were standardized, and practices properly related to the standardization were set up to govern the carrying of permanent stock of the types mostly used. As is clear from Figure 3, storage space required was greatly reduced by this expedient, and errors and uneconomical designs were avoided through the correct application of

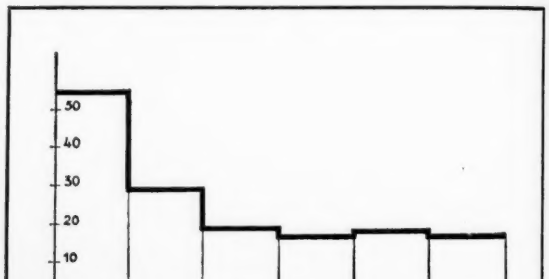


FIG. 2

Number of Files Used per Year per Workman

materials made easy by this standardization.

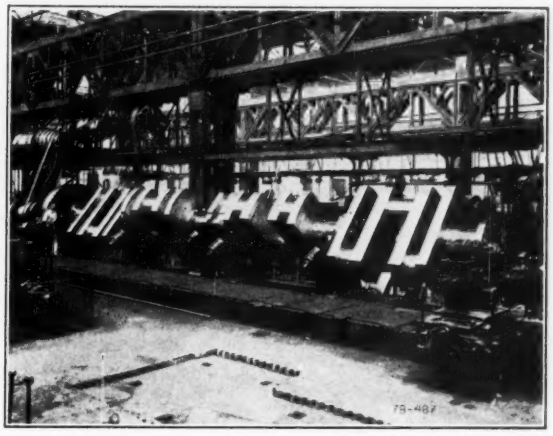
The machine parts themselves were then taken up for study, since individual departments, as is common in large works, had their own standards, arrived at in large measure independently. This unification resulted in standards for screw threads, keys, screws, nuts, washers, wedges, split pins, rivets, handles, hand wheels, chains, parts for pulleys and shafting.

Since the plant manufactured complete heating and water power installations, refrigerating machinery, pumps and hydraulic installations,

sugar refineries, breweries, distilleries, gas works, and chemical works, attention was naturally paid to the design of standardized pipe work, and the most commonly used fittings and parts, such as valves, gates, cocks, as well as the inside diameters of pipes, with the necessary detailed standardization of flanges, ells, tees, etc., have been systematically standardized. Consideration was given to existing standards in foreign countries and close cooperation was at all times maintained with the Czechoslovakian national standards committee. Special fittings called for by the peculiar requirements of sugar factories, breweries, distilleries, locomotives, etc., are also developed on a standardized basis. The usual resistance to the introduction of standards was noted—the natural conservatism of the worker and the foreman, and their unwillingness to change with the changed industrial and economic situation—and many such difficulties will always continue as problems to be overcome.

As early as 1925 steps were taken to enlarge the field of the standardization (which had previously been related mainly to items of general application) and the work was now extended to different departments of the plant. In this way standardization units were organized in departments of electrical production, turbines, condensers, mining machinery, valves and fittings,' war material, sugar refinery and brewery installations, boilers, locomotives, and automobiles. Here, likewise, the advantages of standardization soon showed clearly—reduction of lost time, increased output, quickened delivery, and lower production costs; besides which may be mentioned the convenience to the user of interchangeable parts which, when subject to wear or breakage, may be readily replaced.

There is in the Skoda Works a special research institute, the importance of which has increased greatly since the war. It is said to be one of the best equipped organizations of its kind in Europe. In addition to testing raw materials and carrying on research work on new problems, it furnishes an important fundamental activity underlying the standardization work of the plant. Its facilities include those for chemical engineering work, the study of refractories, foundry materials (the Skoda methods along with the methods of the American Foundrymen's Association, relating to grain size, binding quality, and permeability of foundry sands are used), cement and building materials, forgings, and castings. The laboratories are equipped, for example, to conduct hardness tests according to the methods of Brinell, Vickers, Rockwell, Shore, and Werner. Standardization is carried on regulating the testing of materials, the methods of taking the sample, the dimensions of test bars, the methods of operating the testing devices, procedure for conducting the chemical analysis, and classification of results. Since the standards provided by the Czechoslovakian national standards association are not sufficiently detailed in all cases for use in production, they have been supplemented by special factory standards which provide, for example, for determining the quality of steel alloys, cast iron, gun metal, brass and light metals, and what are known as "semi-finished" products in steel and non-ferrous metals. Special works standards were developed also for materials and stores used in factory operation and maintenance, such as oils and other lubricants, chemicals, liquid fuels, refractories, etc. These standards are



A 51-Ton Shaft Manufactured at the Skoda Works

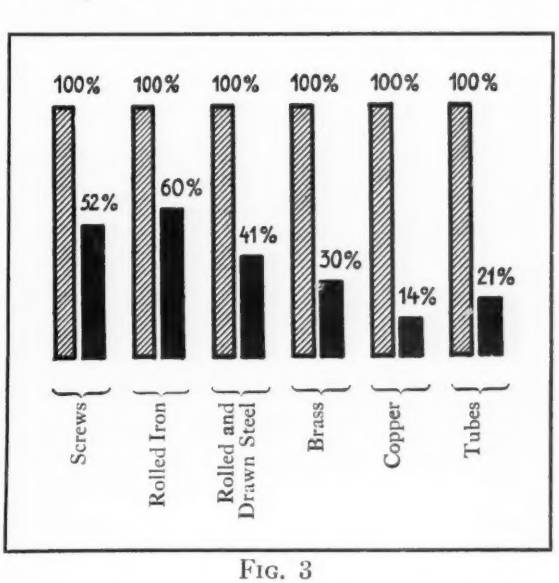


FIG. 3

Number of Sizes before and after Standardization

revised from time to time. They are based on scientific principles and intended to be entirely consistent with the requirements involved in Skoda Works production. These standards provide a rationalization of the operations governing the testing and evaluation of materials, of the processes of procurement and sales, of the operation of storerooms, and of the major elements of the work involved in design and production.

Another important field of standardization was that on insulating materials, which in their way are just as significant to electrical design as steel and iron for mechanical construction. Many tests were required and many studies made to provide a standard basis for selection and preparation of the electrical and mechanical properties of these materials.

The number of standard sheets in use already totals about 2500. The Skoda Works were instrumental in the first studies which led to the establishment of national standards in Czechoslovakia. Realizing as its engineers did that standardization at home necessitated coordination of the standards in the world with which one's plant is in contact, the Skoda Works participates actively in many expert committees of the Czechoslovakian national standards association. Now, as is well known, there are special groups, for electrical engineering standardization, for example, in all the national standards associations. In Czechoslovakia this group is based upon the organization of the Czechoslovakian Electrical Engineering Society, a large part of whose standards are the result of collaboration of technicians of the Skoda Works. It is interesting that the Skoda Works recognizes as among its most important future tasks the following:

the continuation of *specialized* standardization in their own works, the general standards now being fairly complete

cooperation with the national standards associations in various countries through the Czechoslovakian standards association

the task of "working for international standardization, the necessity of which becomes more noticeable every day"

Inspection Safeguards Purchase on Specification

The importance of careful inspection of materials purchased on specification is pointed out by the *Electrical World* in a recent editorial. The inclusion of specifications in some purchase orders, the writer of the editorial asserts, is merely a part of a ritual and has little justification since no basis for inspection is provided.

"Of course," the editorial says, "if material or equipment that is bought on specification should go 'haywire' during operation, from inherent fault, then the buyer may recover from the seller. But the fault must be proved to be inherent, not one caused since the purchase. That is none too easy if the purchase was made several years before. Furthermore, a fault disclosed by operation usually does damage in bringing itself to notice, and although there may be recovery for the fault itself, it will be extremely difficult to collect for the damage it caused. It is much better to find the fault before it has a chance to advertise, perhaps violently, its presence in operation.

"The only way to ascertain whether goods purchased are in conformity with the specifications is to inspect them and find out. The time to inspect is before the bill is paid. Inspection of purchases must be a regular organized function in charge of responsible men. Only in this way can purchase by specification be more than a futile gesture, a vestigial habit."

Non-Staining Lubricant Specifications Prepared

Specifications for a non-staining lubricant for knitting machines have been drawn up for the National Association of Hosiery and Underwear Manufacturers by a research associate at the U. S. Bureau of Standards. The lubricant has proved to be strictly stainless under practical tests in three hosiery mills. The specifications follow:

1. Viscosity at 100 F: Not less than 75 nor more than 100, Saybolt.
2. Flash point: Not less than 300 F.
3. Corrosion test: A clean copper strip shall not be discolored when submerged in the oil for three hours at 212 F.
4. The neutralization number shall not exceed 0.10.
5. Acid test: To 10 cc of the oil in a test tube add 5 cc cp sulfuric acid, 1.84 specific gravity. The liquids shall remain colorless.

Since the viscosity may be too low for large bearings the higher viscosity may be used for such bearings, the other requirements of the specifications remaining the same.